

# Fungal Infection of skin (17)

- Room Temp → Molds  
- Human Tissue or Culture at 37°C → Yeast

## Introduction

### Classification of fungi:

MultiCellular fungi (Molds)

present in form of Filaments called Hyphae (Mycelium is a mass of Hyphae)

Types → Dermatophyte Molds e.g. Tinea, Non " " e.g. Aspergillus

Unicellular Fungi (Yeast)

present singly in form of one cell.

reproduct: is by

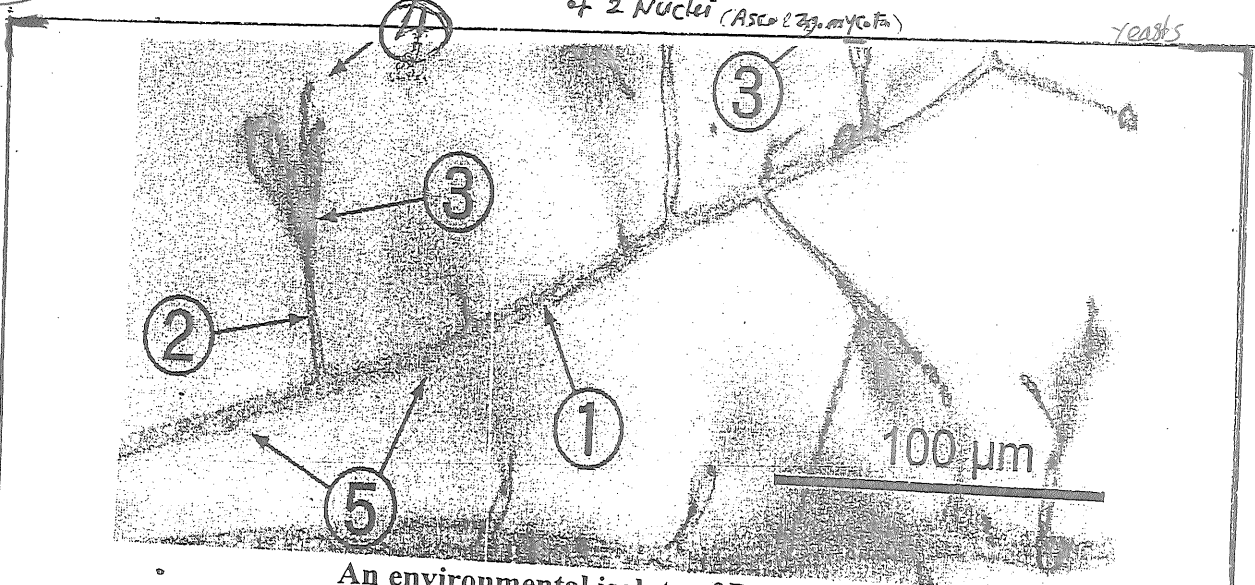
Binary fission, Budding or by

Pseudo hyphae

e.g. Candida & Malassezia, Cryptococcus

Reproduct: is by format: of spores

Sexual Formed by union of 2 Nuclei (Ascomycota) Asexual



An environmental isolate of Penicillium  
1. hypha 2. conidiophore 3. phialide 4. conidia 5. septa

The thallus of mould is made of hyphae, which are cylindrical tube like structures that elongates by growth at tips. A mass of hyphae is known as mycelium. It is the hypha that is responsible for the filamentous nature of mould. The hyphae may be branched or unbranched. They may be septate or aseptate. Hyphae usually have cross walls that divide them into numerous cells. These cross walls, called septa have small pores through which cytoplasm is continuous throughout the hyphae. Therefore all hyphal fungi tend to be coenocytic (multinucleate). With exception of zygomycetes (Rhizopus, Mucor), all moulds are septate.

### 2. Unicellular Fungi: (Round & Pseudohyphae):

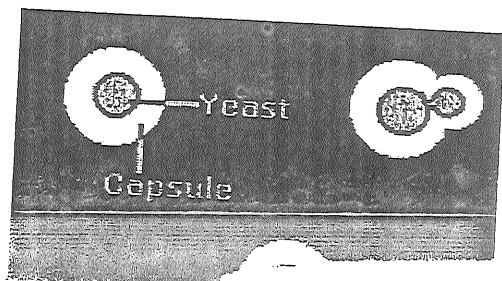
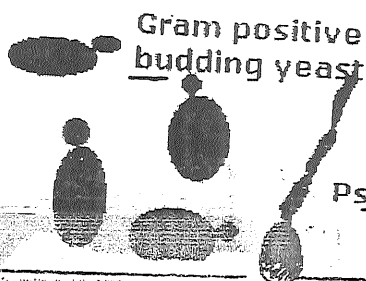


TABLE 23-1. TERMINOLOGY OF FUNGI

| Term               | Definition   | Example   |
|--------------------|--|---|
| Dermatophyte       | Imperfect fungi  | ③ ← <u>Trichophyton</u> ,<br><u>Microsporum</u> ,<br><u>Epidermophyton</u>                                  |
| Dermatomycosis     | Any fungal infection of the <u>skin</u> caused by dermatophytes, yeast, or fungi including those that do not usually cause disease |   |
| Arthrospores       | <u>Asexual fungal spore</u> formed by hyphal segmentation  | <u>Coccidioides immitis</u>   |
| Hyphae             | The <u>fine branching tubes</u> that make up the <u>body</u> (or <u>mycelium</u> ) of a multicellular fungus                       | Dermatophytes   |
| Mycelium           | <u>Intertwining mass of hyphae</u>   |   |
| Yeast              | <u>Round to oval fungal forms</u> that reproduce by <u>budding</u> or <u>blastogenesis</u>   | <u>Candida</u> , <u>Cryptococcus</u> ,<br><u>Malassezia</u>   |
| Blastoconidia      | <u>Daughter cells</u> of parent yeast  |   |
| Pseudohyphae       | A <u>chain of easily disrupted</u> fungal cells with constrictions rather than depth at the junctions                              | <u>Candida spp.</u>   |
| Dematiaceous fungi | Mold or yeast with <u>melanin pigment</u> in their walls   | <u>Phaeohyphomycosis</u> ,<br><u>Chromomycosis</u>  |
| Sporangia          | <u>Spherule</u> containing endospores  | <u>Coccidioides immitis</u>   |
| Sporangioblasts    | Another term for endospores  | <u>Rhinosporidium seeberi</u>   |
| Grains             | Dense accumulations ( <u>microcolonies</u> ) of fungi or bacteria  | <u>Eumycetoma</u>   |
| Tinea              | Clinical term to describe <u>superficial fungal infections of the skin</u>   | <u>Tinea</u><br><u>Faciei</u> , <u>cruris</u> , <u>pedis</u> , <u>manus</u>                                 |
| Dimorphic          | Fungus that <u>grows in more than one form</u> (mold, yeast, sclerotic body, sulfur grains, spherules with endospores,             | <u>Histoplasmosis</u> ,<br><u>coccidiomycosis</u> ,<br><u>blastomycosis</u> ,<br><u>paracoccidiomycosis</u> |



Inf. ④

A Superficial:

- doesn't induce significant Histopathological response (inflammation)

- S. PVC (TVC)
- Piedra
- T. Nigra

B Cutaneous:

فوق سطح  
S.C  
Stratum Corneum

- Can Induce Hp response (inflammation) (changes)

- S. Dermatophytes (Ring worms)
- Candida

C Subcut. Mycoses:

- infect dermis & S.C.T d.t Traumatic Implantat<sup>n</sup> of organism present in the Environment

- Sporotrichosis
- chromoblastomycosis
- MYcetema
- lobomycosis (S.C.M.)
- phaeohyphomycosis

NB

Dermatomycesis:  
→ inf by any fungi

Dermatophytosis:  
→ Dermatophyte inf.

D Systemic Mycoses:

- Infect deeper structures by inhalati<sup>n</sup> Hematogenous disseminat<sup>n</sup>

Endemic respiratory Mycoses (Dimorphic)

- Histoplasmosis
- Blastomycosis
- Coccidioidomycosis
- Paracoccidioidomycosis
- Phaeohyphomycosis

Mode: inhalat<sup>n</sup>  
affect RT  
Endemic in certain areas

Opportunistic Systemic

(in Immuno suppress<sup>n</sup> in any geographic area)

- Candidiasis
- Cryptococcosis
- Mucormycosis
- Fusarium
- Aspergillosis

Crypto Cocciosis shows features of Both.

•• Dimorphic are: Sporotrich + Endemic Respiratory

- 1- Histoplasmosis
- 2- Cryptococcosis
- 3- Blastomycosis

# (1) Superficial fungal skin infection → TVC (Pityriasis or Tinea Versicolor)

(Versicolor)

- Egg. dist → hot, humid, tropical.
- Incid. Rate there → 30-40% of populations.

(2)

Malassezia on NL skin Flora

In TVC there is ↑ NO then

shift

from Fungus (Yeast)

form to

Mycelial

Form (Filament)

- Age → young adults (20-35 Ys) (time of most active glands)
- Sex → Neomates (<6ms ??) (rare before pub. & >65 Ys).
- AET: • Dimorphic Yeast (Commensal Pathogenic)

[Malassezia is Lipophilic]

• Malassezia furfur

14 نوع

(Androgen) → سكر الدم

سريع

→ M. globosa

→ M. sympodialis

M. nana

(Commensal Yeast)

20% of infants.

100% of Adults

but in small amount on NL skin

under predisposing

Conditions. Change to (Pathogenic: Mycelial form)

- 1- High Temp. & Humidity & Sweating
- 2- Hereditary: (+ve FH) in (18%) of pts

3- Immune Compromised: Cushing, Cs

→ 4- bath oils & Skin Lubricants

5. pregnancy. & OCPs

Step 1, 2

Q. Clinical Variety: (سريع)

- |  |               |
|--|---------------|
| 1. Hyperpigmented  | 7. Papular    |
| 2. Hypo pigmented  | 8. Atrophic   |
| 3. Erythematous (pink)   | 9. Trichotome |
| 4. Follicular (erythem. papules or pustules).                            |               |
| 5. Inverse (affect flexures)   |               |
| 6. Achromia parasitica (Paler lesions in sun tanned & dark individuals). |               |

(more in Immuno comp).

the dis is

asympt. but disfiguring, However slight Itching may occur. Spont. Remission may occur in Winter & recur. in summer.

(Recurrence Rate: 60-80% Why ??)

± d.t

→ inadequate Coverage of Large infected areas (or) certain unknown predisposing factors.

• Sites: any site can be affected; but the commonest is seborrheic rich sites (chest, back, proximal limbs). Fine scaling covers the lesions. (سريع)

(4)

## What's NOT in PV??

- NOT an infectious disease.
- NOT more common in patients with poor hygiene.
- NOT cured by washing & scrubbing.



منعك لطفك لطفك  
لو كان جلدك سليم بطبعه  
عشان عدها قليل

- 1 Typical clinical features
- 2 W.L → -- ?? Yellow Fluorescence @ Hypo pigm.
- 3 Direct KOH Exam. of scraping or a Cellophane tape & Methylene blue Reveals double
- 4 Pathology: (H&E)
  - Spaghetti & Meat balls: short thick hyphae (cigar-butt sign) + Large no of Variable sized spores

قوى

- Hyperkeratosis & parakeratosis = scales
- Acanthosis → ↑ thickness of spinous cell layer
- perivascular inflt. - Lymphocytes, Plasma cells, Histocytes

Special Stain:

PAS or Methanamine Silver:

in st. Corneum

- Abundant hyphae
- Round, budding, cellular fungal element

dia enriched e  
C14 sized fatty acids.

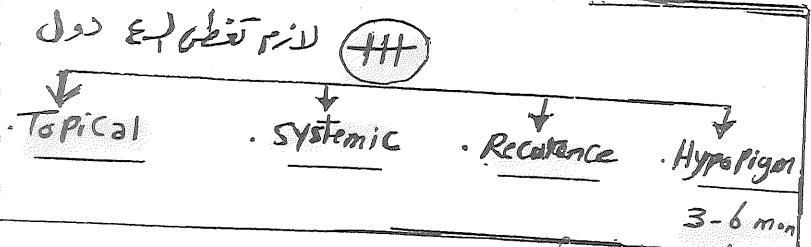
- 5 Culture: (exotic) [NL Flora]

قوى

### Pathogenesis of Hyperpigmentation & Hypopigmentation

- 1 Hyperkeratosis
- 2 Large No of organisms
- 3 Superficial Lymphocytic inflt.
- 4 Macromelanosomes

- 1 Production of dicarboxylic acids as "Azelaic w"
  - tyrosinase
  - Cytotoxic to MCs → NL MCs but → ↓ Melanosomes
- 2 M. Furfur may Filter UVL → Prevent tanning of infected areas.



### A Topical #:

- 1 Imidazole group of antifungals (Ketconazole?)
- 2 Antiyeast Antifungals: (Miconazole, Clotrimazole)
  - Selenium Sulphide 2.5% eg Selsun Blue
  - Zinc pyrithion 2% eg Seborrheal shampoo
  - Na<sup>+</sup> Sulfacetamide (20%)
  - Na<sup>+</sup> Thiosulfate

لوه ن تقطع بع دول  
دواء مرشيد  
طبة  
ميو تنزه الحنة ١٠ دقا  
ثم لطف او دهن  
دواء حياها طبة

Trunk

B) Systemic  $\nabla$  extensive  
 $\nabla$  Recurrent  
 $\nabla$  Resistant.

15

(7)

x ① Griseofulvin :  $\rightarrow$  Not effective

x ② Terbinafine: eg lamisil or Terbin  
 . systemic  $\rightarrow$  Not effective

Topical  $\rightarrow$  Effective.  
 eg Terbinafine foam spray

③ Fluconazole (150 caps)  
 e.g. Fiumoral  
 Diflucan  
 1-2 كبسولة أسبوعياً  
 2-4 أسابيع  
 2x2 w

④ Itraconazole (100 caps)  
 e.g. Itralon  
 Itraped  
 كبسولات مرتين يومياً لمدة ١٤ (٤) أسابيع  
 2x7 days

x ⑤ Ketoconazole (200 mg tab) :  
 hepatotoxic لأنه  
 تم إيقافه لسبب  
 ٢ قرص جرعة واحدة أو قرصين يومياً لمدة  
 ١٠ أيام  
 2 أسابيع  
 1x10 (أو)

C) Prophylactic  $\nabla$  (prevention of Recurr.) (الناظرية)

الشامبو  
 كبسولات  
 (A) Nizoral shampoo : For life مرة كل أسبوعين أو أسبوعين  
 (B) Ketoconazol, Itraconazol or Fluconazol  
 (1-2 كبسولة كل شهر وهو مفضل)  
 (الصفحة)

D)  $\nabla$  of Hypopigment:  
 ① Reassurance (ما يوجد له علاج)  
 ② Topical Cs  
 ③ NB-UVB

6

① TVC

② S.D &amp; Dandruff

③ AD (Atopic dermatitis)

④ pityrosp. folliculitis

⑤ Seborrheic dermatitis

⑥ Confluent & Reticulate  
Papillomatosis. (CRP)

\* Has role in acne

- 1<sup>st</sup> coq.
- Nemat.
- systemic mg
- Nematostatin
- IV fat emulsion
- Blepharitis
- otitis externa
- Acne Necrotica
- Miliaris
- chr. dermatitis
- pit. Alba ??
- onychomycosis

(Malassezial Folliculitis)

Pityrosporum Folliculitis

Def: Pityrosporum yeast inf. of hair follicles. (Furfur &amp; Globosa).

predisposing agents:

- ① Tetracycline use in Ht of Acne.
- ② Temp. & Humidity.
- ③ occlusion.
- ④ DM & Immuno-suppression.

Criteria for Dx: (Q > 0<sup>+</sup>):

- ① chr Morphology: chr, Moderately itchy, dome shaped follicular papules & pustules that:

مطابق عیون  
 { Affect central back & chest & + Face  
 ✓ Itchy  
 ✓ Grouped (Molluscum like)  
 ✓ young adult taking (Tetracycline) for Acne.

- ② Wood's Light: yellow green.
- ③ +ve smear or Biopsy (only yeast forms / No hyphae)
- ④ Prompt Response to Antifungals.

① Treatment: as "TVC" ✓

- ② DD: 1 - AV  
 2 - staph folliculitis  
 3 - Acne form Erupt

(عقب بقرعة)

syst  
 Iso tretinoin  
 +  
 AKmetoxide

نابینا بیچر  
 لطافت بخور  
 Acne  
 Folliculitis  
 ↓ اعلى  
 Panoxy 15 gel  
 به شغل مع لکل

Different species of Malassezia and common clinical presentations.

(را حفظ في أسماء  
لشعوى)

| DIFFERENT SPECIES OF MALASSEZIA AND COMMON CLINICAL PRESENTATIONS |   |
|---|---|
| Species of Malassezia   | Common clinical presentations   |
| <i>M. furfur</i>  | Pityriasis versicolor, seborrheic dermatitis, folliculitis, neonatal cephalic pustulosis, blepharitis, and systemic infections in neonates receiving intravenous fat emulsions                |
| <i>M. globosa</i>   | Seborrheic dermatitis, pityriasis versicolor, folliculitis, neonatal cephalic pustulosis  |
| <i>M. sympodialis</i>   | Pityriasis versicolor, neonatal cephalic pustulosis <sup>(*)</sup>  |
| <i>M. pachydermatitis</i>   | Often isolated from domestic and wild animals; has occasionally been implicated in cases of systemic infection in humans; may play an important role in chronic dermatitis and otitis externa |
| <i>M. restricta</i>   | Seborrheic dermatitis   |
| <i>M. slooffiae</i>   | Uncommon isolate  |
| <i>M. obtusa</i>  | Uncommon isolate  |

المطروحة النوع

Malassezia

1. Furfur
2. Globosa (TUE)
3. Sympodialis (أجف قفصا)
4. restricta
5. obtusa
6. pachydermatitis
7. slooffiae
8. nana
9. Japonica
10. Yamatoensis
11. dermatitis

## Confluent & Reticulate Papillomatosis

(Gougerot - Carteaud Synd.) (2014)

Mid line ← chest  
back

- affects girls soon after puberty. (new 1:1)
- Hyperpigmented grayish-brown papules in: Neck, Flexures, intermammary & interscapular areas. Cooksense

Topical & systemic Antibiotic & Antifungal

Treatment: (Best)

1- Topical:

&

2- Systemic:

- ①. Oral Antibiotic - Fucidin
- ②. Mupirocin - Retin A
- ③. Tazarotene - Antifungals.

- Minocycline
- Erythromycin
- Antifungals.

Reticulated Pattern peripherally & confluent plaques centrally. ± Papillomatosis

## Etiopathogenesis

- Hereditary
- Endocrinopathy (Cushing & pregnancy)
- Keratinization disorder (↑ K16)
- Bacterial → Dietzia strain X (strain of Actinomyces)
- Fungal → Malassezia
- Amyloid Type.

DD AN (acanthosis Nigricans)

- PVC
- Darrier
- Terra firma form ← انقصة بقعة
- Pseudo atrophoderma
- Coli
- Dermatitis neonatal ←

DD diseases of midline

- CRP
- Petaloid SD
- Pityrosp. folliculitis
- REM synd.

(8)

Other Non inflammatory Superficial  
Mycoses

(11)

- Tinea Nigra
- Piedra

• Tinea Nigra  
(Superficial Phaeohyphomycosis)

- Epidemiology: • Age, sex, Race → any  
• Common in Tropical climates (افريقيا، أمريكا، وشرق أوروبا)

- Causative Fungus: (Hortaea Werneckii) هورتا فيرنكيس  
(Phaeoannellomyces Werneckii) فاسم

- CIP Asympt., Palmar (rarely plantar) Hyperpigmented  
(Brown, Black, gray or green) Patch, non scaly (but ±  
scaly or velvety). (rare in sole)

- KOH & Culture → Demataceous Fungus (Pigmented  
Sabouraud's Hyphae)

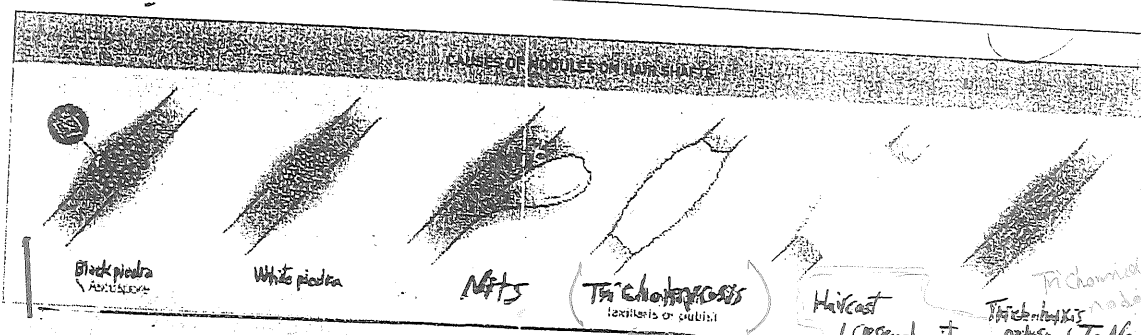
- (نادر)  
• DD ① Melanocytic Nevi & Melanoma<sup>Mg</sup> → Metastasis  
② FOE → sudden onset ← Fixed drug eruption  
③ Addison's → palmar

- ## Topical Azoles

# Piedra

Def.: Piedra, which means 'stone' in Spanish, is an asymptomatic superficial fungal infection of the hair shaft

|  | White piedra  | Black piedra   |
|--|---|--|
| Causative organism<br>&<br>Source.                 | <i>Trichosporon beigelli</i> (الاسم T. Asahii). + other 5 species<br>* Source: soil, air, water, vegetable matter, or sputum or on body surfaces (Flora)  | <i>Piedraia hortae</i><br>* Source: soil & stagnant water.                                       |
| Favored climate                                    | * Temperate and semitropical climates (such as those in South America, Asia, Europe, Japan, and parts of the southern United States).   | Tropical (many central South American countries, including Brazil, as well as in Southeast Asia) |
| Pathogenesis                                       | Infection usually commences under the cuticle of the hair shaft and extends outward. Hair breakage may occur as a result of shaft rupture at the site of the nodules. As the nodules enlarge, they can even envelope the hair shaft |  |
| Nodule color                                       | White (may be red, green or light brown)<br>Face  | Brown to black   |
| Nodule firmness and adherence                      | Soft and loosely attached to hair   | Hard and firmly attached   |
| Typical anatomic location                          | • Face & Flexures (beard) الزقن   | Scalp and face (occasionally in pubic region) الرأس  |
| KOH examination of 'crush prep' of cut hair shafts | (Non)dematiaceous hyphae with blastoconidia and arthroconidia   | Dematiaceous hyphae with asci and ascospores   |
| Culture on Sabouraud's agar                        | * Moist, creme-colored, yeast-like colonies   | brown-black colonies   |
| Treatment  | 1- Topical: Clip affected hairs (ttt of choice), wash affected hairs with antifungal shampoo (نيزورال-سلسن بلو-باتر افين-). (ميكوناز)<br>2- Systemic (terbinafine)  |  |



DD: Causes of Hair Shaft Nodules

- Piedra
- Nits
- Pseudonits
- Trich. Nodosa
- Trichomycosis

# **Dermatophytes** (Dermatophytosis, ringworm, Tineas)

**Introduction:** Pathogenic keratinophilic fungi, that can attack dead keratinous structures of skin (st. corneum), hairs and nails and produce disease known as ringworm or tineas.

## **Classification :**

### 1- According to their macroconidia (asexual spores):

Trichophyton (abbreviated as "T") : attack the skin, hair and nail.

Microsporum ("M"): attack skin and hair.

Epidermophyton ("E"): attack skin and nails.

### 2- According to their ecology (source):

| TYPES OF DERMATOPHYTES BASED ON MODE OF TRANSMISSION  |                         |  |
|---|-------------------------|--|
| Category  | Mode of transmission    | Typical clinical features                                    |
| <b>Anthropophilic</b><br>( <i>T. rubrum</i> , <i>T. tonsurans</i> , <i>T. violaceum</i> , <i>T. schoenleinii</i> , <i>M. audouinii</i> and <i>M. ferrugineum</i> ).   | Human to human          | Mild to non-inflammatory, chronic                            |
| <b>Zoophilic</b> (Cats, Dogs, <i>الكلب</i> )<br>( <i>M. canis</i> ; originating from cats and dogs, <i>T. verrucosum</i> ; originating from cattle, <i>M. distortum</i> ; a variant of <i>M. canis</i> ) <i>T. Mentagrophy</i> .) | Animal to human         | Intense inflammation (pustules and vesicles possible), acute |
| <b>Geophilic</b><br><i>M. gypseum</i> , <i>M. fulvum</i>  | Soil to human or animal | Moderate inflammation  |

- Microsp → Animal except  
1. *M. aud.*  
2. *M. Ferrugin*
- Trichoph. → Human except  
- *Verrucosum* /  
- *Mentagrophytes*

- WL
- Microsp → +ve
- Trich. → -ve  
Except *schoen*

- Microsporum → Small ecto
- Trichophyton → Large ecto, endo, Favic

## **Tinea (ringworm)**

**Def.:** Dermatophyte skin infection.

**Types :** Depending on which part of the body is affected, it is given a specific name.

- Tinea capitis (head)
- Tinea faciei (face) ← (Non hairy part of face)
- Tinea barbae (beard)
- Tinea corporis (body) or (Circinata)
- Tinea cruris (groin) ← (Buttocks)
- Tinea manuum (hand)
- Tinea pedis (foot)
- Tinea unguium (nail) = Onychomycosis

HL

## **Pathogenesis :-**

- ① Adherence : to KCS. (*Arthroconidia* KCS)  
inf → *Arthroconidia* → *Arthroconidia*
- ② Germinat : of *Arthroconidia* & Prolongate of Hyphae.
- ③ penetrat : of & in bet. KCS (st. corneum)
- ④ Host immune resp. development of inflamm. at dermis & st. Malpighii

## **Host Defence against fungi**

- ① Transferrin attack & bind to Hyphae
- ② Fatty acids from Seb. glands ... growth
- ③ Dermatophytes itself are chemotactic → Complement, Neut. & Monocytes
- ④ CMI
- ⑤ HI (Igs ??) ✓ In wall of *T. rubrum* → -- CMI → inf tends to be chronic
- ⑥ Mannan : Poly saccharide



## Tinea Capitis

**Def.:** Dermatophyte infection of skin and hair follicle of scalp (or eyebrow & lashes)

**Epidemiology:**

Age: usually < 10 years (peak 3-7).

(مفوى: ليه نادرة فالكبار)

Sebum

Malassezia

مفوى

The most Common

T. tonsurans

M. canis

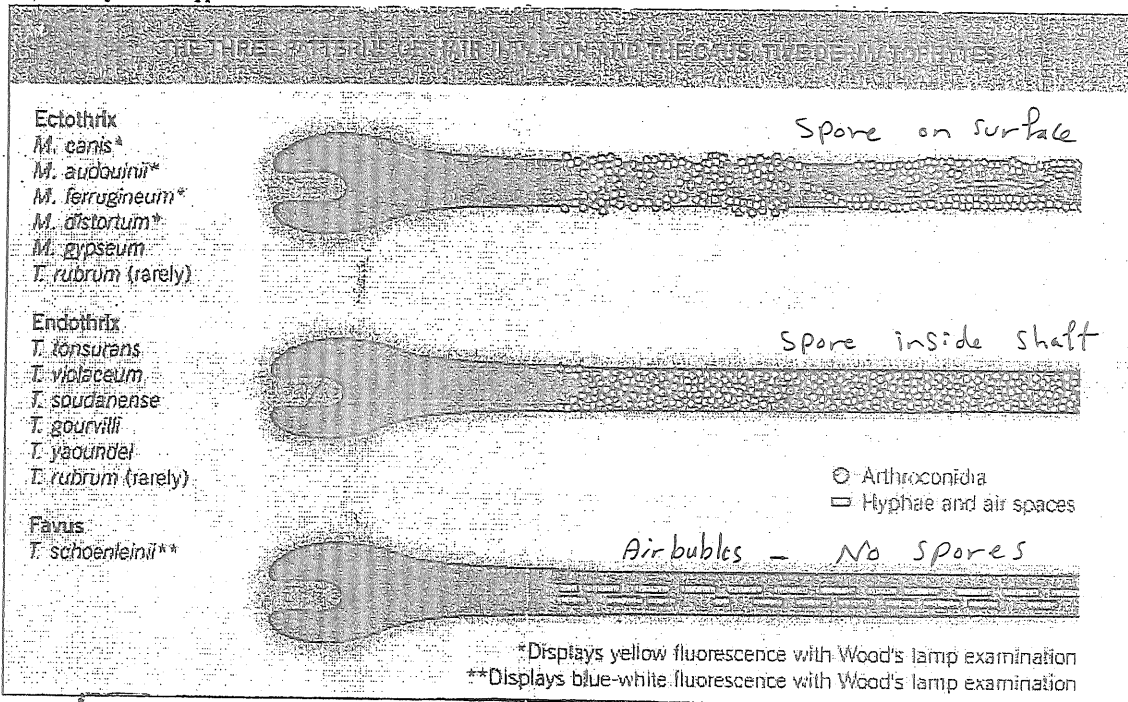
T. violaceum

Never

E. floccosum

T. rubrum

T. interdigitata



### Ectothrix

- Hyphae: inside the Hair Shaft

- Spores: on surface of the Hair Shaft → mild damage (damaged Cuticle)

small spore Ecto-

thrix  
 spores are small & disarranged.

clinically  
Scaly Type

- M. audouinii
- M. canis
- M. gypseum

### Endothrix

- Hyphae & Spores are inside the hair shaft → severe damage. Intact Cuticle

large-spored-

Ectothrix  
 spores are large & arranged in chains.

clinically  
Kerion  
 (large spore animal type)

- T. verrucosum
- T. mentagrophytes

### Favus

- Hyphae & Air bubbles inside the hair

(No spores)

minimal damage but looks abnl. (Lusterless).

- They survive at Hair surface → Tangled mass of Hyphae & KCS, debris (Scutula)

clinically  
Favus

T. schoenleinii

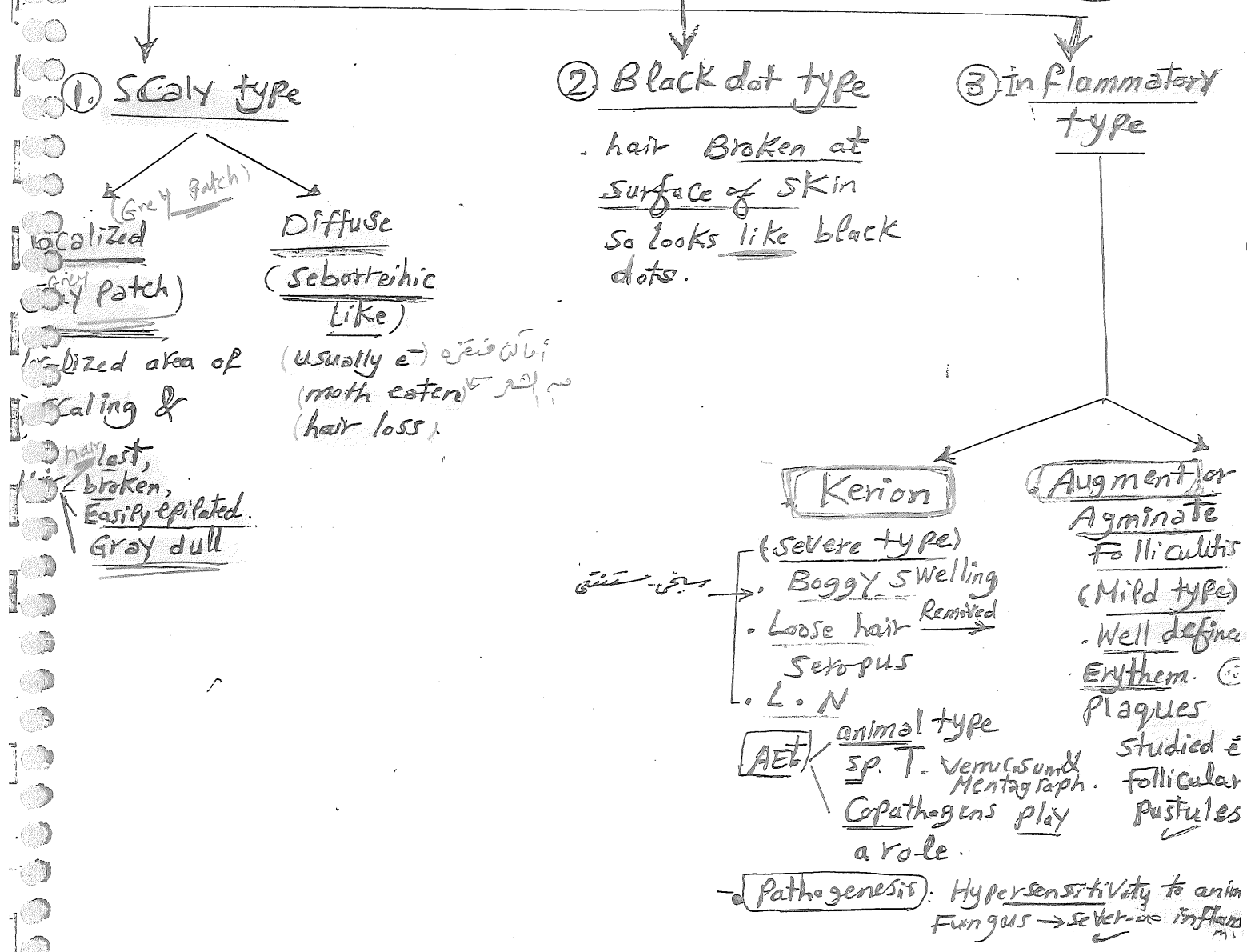
- T. tonsurans
- T. violaceum
- T. soudanense

All Types of Fungi cause Ectothrix (EXCEPT) (Tons., viol. & Schae.)

T. rubrum (rare): Ecto & Endothrix

# 4. Clinical types.

(17)



## ④. Favic type (Favus = Honey Comb)



start at childhood & may progress to adulthood

may affect skin, Hair, Nail

ck by: - Scutula (Sulfur Cup Pierced Centrally by the hair)

③ - Mousy or cheesy odour

- Hair: intact but Lusterless atrophic scarring.

Don't Resolute At puberty .. !!

organism: T. schoenleinii

**NB:**  
Scutulas  
Colonies + Inflamm. exudate

only Kerion & Favus if Not Treated → Cic. Alopecia.

## Diagnosis:

1. Scalp & KOH:

2. W.L → only +ve → Green-fluorescence.

3. Biopsy & Culture

(14)

DD of T. Capitis = DD of scaly scalp in children.

(... جزاء جزاء جزاء ...)

### Localized scaly type (Gray Patch)

AA ← adult (Wk)  
sudden onset  
completely NL  
scalp is  
totally devoid  
of hair  
Exclamation Mark.

### B. Diffuse scaly scalp (Seborrheic Like T. Capitis)

1. SD ← adult  
greasy scales  
Erythema  
other Seb. sites

2. AD: other atopic  
manifestations.

3. Psoriasis ← Erythema  
silvery scaling  
More marginal  
other sites.  
+ve Biopsy.

4. PRP: other manif.

Trichotillomania ← usually ♀ child or Adolescent  
bizarre hair  
picture (some intact  
some broken)  
intact scalp  
Window test ??  
Biopsy

Trich & Alopecia ← Moth eaten  
Alopecia  
invs for ♂: +ve.

Crusted impetigo: ← Crust (not) scale  
Pus & matted hair.  
± pediculosis

Pityriasis Amiantacea: (See P.S.).

Scarring Alopecia (See Cicatricial  
Alopecia).

### C. DD of Kerion, for

Abscess

1. More constitutional  
manifestations

2. + L.N

3. incision → pus

4. No hair falling

Kerion

↓ L.N & FAHM  
hair loss. incision → pus

18

# Treatment

- Systemic (F.A.S.) (5)
- Topical: Adjuvant (↓ Shedding & Infectivity)

① - Griseofulvin (1st line)

Adult: 0.5 - 1 gm / day (Micronized)

Children:

tab → 125 mg tab  
susp → 125 mg / 5 ml

Grise. dose  
Weight  
Type of Inf.  
Microsporidia > Trich.

Griseovin

Micronized: 10 - 20 mg / Kg / d

Ultra micronized: 5 - 10 mg / Kg / d

ultra Griseovin

with Fatty meal  
or Ice Cream for  
6 w - 8 w

(Some resistant  
Cases need  
upto 16 w)

طريقه اخرى

② Terbinafine:

eg Lamisil

جرام حبة 125 و 250  
آيس كريم

3 - 6 mg / Kg / d (wt < 20 kg → 62.5 mg / d | wt: 20 - 40 kg →  
For 4-8 w 125 mg / d | wt > 40 kg → 250 mg / d)

more effective against Trichophyton

③ Ketoconazole: Not preferred due to Hepatotoxic effect

3 - 4 mg / Kg / d For 4 w.

④ Itraconazole

eg Itracon  
Itrazona

Continuous 3 - 5 mg / Kg / d for 4-6 w

Pulse: 5 mg / Kg / d for 1 w

Repeat (4 w)

⑤ Fluconazole

Every day: 8 mg / Kg / d for 6 w. (6-6)

Every Week: 8 mg / Kg / W for ≈ 16 w. (8 for 16)

فعليا في الحماية لا تستخدم الا في حالات  
وليس في حالات حادة ولكن في حالات مزمنة

فطر Itraconazole و Lamisil لا يجرى في حالات حادة

## Triple therapy

Kerion

Systemic Cs: 1 mg / Kg / d for 2-3 w.

Septtrin: for 10 days

Griseofulvin for 6-8 w.

Cs  
+  
AB  
Anti fungal

Griseofulvin not act e infect. (فعليا في الحماية لا يجرى في حالات حادة)

15

(19)

T. Faciei

(7)

Dermatophyte inf. of <sup>(non hairy) skin</sup> glabrous skin of the face

Site

♀  
Children

Onl area of  
Face

Adult: Facial Areas  
Other than beard  
& Moustach.

Cip:

(1) T. Corporis like: (Annular) ←

(2) ECZEMA / PS. like (Non Annular Erythematous, scaly patch).

DD:

(1) Dermatitis:

- Seborrheic
- Perioral
- Contact

② Rosacea

③ L.E.

④ psoriasis

⑤ AV.

T. Barbae

Def. Dermatophyte inf. of Beard & Moustach of <sup>(Post Pubertal)</sup> Men (رجال), (مراهقين), (بنا لا يقبل)

Cip

• Varieties: <sup>نوع</sup>

Widespread  
Hair loss

1- T. Circinata like.

→ ② - Bact. Folliculitis like.

③ - Kerion like.

4. Verrucous (HIV)

5. Lupoid Syphilis (LV like)

→ Anthrophilic (mild)

→ Zoophilic (Severe)  
(Severe)  
(المرض داءاً بائناً)  
(علاج)

T.B of skin

DD:

1. Bact. Folliculitis
2. Viral ~
3. AV
4. Cervicofacial Actinomycosis
5. Dental Tract sinus

III

1. Warm Compresses
2. Hair Epilation
3. Topical & Systemic Antifungals.

(16)

1. Corporis = Circinata

Dermatophyte Inf. of Skin other than <sup>scalp</sup> face <sup>groin</sup> Hand & Feet.


Clinical Types

1. Classical = Circinate: Annular or Seppigenous Patch ē


Clear center & Active Edge ±   
 raised, scaly, mildly itchy → Anthropophilic  
 raised, vesicular (Eczematous), severely itchy → Zoophilic.

2. Psoriasiform = non Circinate.

(ZF) 3. Follicular pustular (Zophilic) & Favic (Crusted)

Tokelau & 4. Imbricata (T. Concentricum) 

5. Concentric rings (T. rubrum).

5. Dermal = Majocchi Granuloma 

Fungal inf of hair follicle.  
 Fungal (T. rubrum) Folliculitis & Perifolliculitis →  
 Rupture into dermis → Granulomatous Inflamm.

What is the Majocchi dis??

may affect:

♂: used Topical Cs on Top of DermatoPhyte inf. Wt at Wrist.

♀: who shave frequently & having Tinea pedis (T. rubrum) Wt at Shin & tibia.

Clinically: Circumscribed Patches & Indurated plaques ē follicular & perifollicular pustules & nodules 3-4 mm, Scarring.

Organism: Commonest: T. rubrum, Microsporum.  
2nd common: T. violaceum.

• Pt. Rosca, ps & LP  
 • Impetigo & HT  
 • Discoid EC  
 • MF  
 • S  
 • EM & urticaria  
 • LE  
 • GA  
 • LV  
 • Leprosy  
 • Sarcoidosis.

DD: Circinate lesion marks

• HT: Same regimen of T. Cruris.

# T. Cruris (Crutch, Jock Itch) (21)

Def. Dermatophyte Inf. of Groin, Inner thigh & Inter-gluteal cleft.

predisposing factors :

- ♂ → occlusive effect of scrotum
- Obese → Moisture & Friction
- Excessive perspiration

CIP { Early: Itchy Erythematous Patches  
late: Well defined circinate or Serpiginous lesions.

Scrotum → rarely affected

lichenification may occur

causative organism { Dermatophytes: ++ → T. rubrum & floccosum  
Copathogens: Candida & Bact.

DD → Intertrigo (inflammation of Flexures or folds).

| Differential of Inguinal lesions |  |
|----------------------------------|--|
| 1. Tinea cruris                  |  |
| 2. Candidal intertrigo           |  |
| 3. Bacterial intertrigo          |  |
| 4. Erythrasma                    |  |
| 5. Seborrheic dermatitis         |  |
| 6. Flexural psoriasis            |  |
| 7. Contact dermatitis            |  |
| 8. Hailey & Hailey disease       |  |
| 9. Flexural Darier's disease     |  |

ای صنف T. Cruris ← در (عددی مع لیس بظنون) T. pedis

## Treatment

A. Clinical: ↓ weight, تجفیف کله پیت + (H of T. pedis) (نزدیجہ)

B. Medical: Topical & Systemic { Griseo.F. → ♂  
 Lamisil → 2w.  
 Itracon. → 1x2x7d.

C. prophylactic (لا نفاطاً بترج) {  
 نیروال شامبو تیرت الرخوة 1. دقايم  
 ثم سيطن 2-1 مرات كل اسبوع.



# Tinea Manum

(22)

☺

Def dermatophyte infection of Hands (Palms Not dorsal Hands).

CIP

dorsal Hand inf. → T. Corporis like

dorsal hands →

Palms & Interdigital: →

Tinea Manum

T. Corporis

• organism: as T. cruris, Pedis & Corporis  
(T. rubrum, Microsporum, & E. floccosum)

• usually non inflammatory & often

unilat. (= 50% unilat & 50% Bilat)

• Moccasin T. pedis: often ass. e

T. manum → 2 feet & one Hand Syndrome

• Clinical Varieties:

- ① diffuse Hyperkeratosis (Housewife ECZ. like) & Scaling.
- ② Exfoliative
- ③ Vesicular.
- ④ Papular.

✓ Clue that may Help in D:

② infection may start at the finger ring or under watch strap then → Spread.

③ Presence of T. ungium.

##  
Itraconazole: 1x1x2w-6 w.  
(OCA) or 2x2x1w  
Griseofulv: 0.5-1gm b  
for 4-6 w  
Fluc: 11w for 4-6 w

- DD: 1. ECZ.  
2. ps  
3. dyshidrosis  
4. dermatophytid reaction

So → • Scraping & KOH  
• Culture  
• Biopsy.

(Toe web infection) **T-Pedis** (Athlete's foot)

4 types

Topical only

① Interdigital types : Copathogens  
(Lat. 3 Toes)

1st → 2nd → 3rd → 4th → 5th

Dermatophyte  
Candida  
G-ve  
(Pseudomonas)  
Corynebacteria  
usually present

white, swollen, macerated, or erythematous webs of Toes.

Topical + Syst

② Scaly Hyperkeratotic (Moccasin type)



limited to thick skin of sole (Heel, sole, web)  
& may affect the border (Heel & fore foot)

patchy or diffuse silvery scaling + erythematous

Minute vesicles → Collarette < 2mm

Chr. & Resistant to H

fix systemic

③ Vesicle bullous : (Acute)

Topical antifungal  
Topical CS  
Syst. antifungal (maybe)

Lesion

Tense Vesicles  
Vesiculopustules  
bullae

at

Plantar arch

Sides of Heel & feet

(thin skin).

④ Acute ulcerative : Dermatophyte + G-ve

Severe ulceration  
Cellulitis  
Lymphangitis  
Fever

**Complications of T-Pedis:**

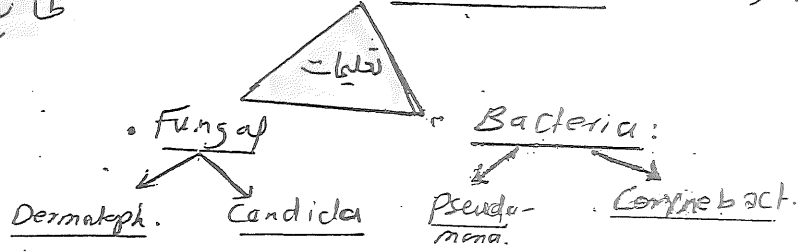
1. Bad odour of feet (Halitosis)
2. Cellulitis & Lymphangitis
3. "Id" Reaction  
Allergic reaction
4. Recurrent T-Cruris

The commonest organism: T. Rubrum

Treatment < other types: fix → systemic

طایفه دیجیتال حالت T. pedis

Hyperhidrosis (usually present)



تعلبات  
 زانف سے مریض جل کر  
 یہاں مریض  
 مریض سے یہاں  
 (Ateation)

② • Hyperhidrosis: Alum. chloride 20% in Alcohol

- ↓ sweating
- ↓ moisture
- antiseptic

③ • Fungal: (Best) Lamisil Cream & Pottafin sol.  
Trosyd powder

④ • G-ve (Pseudomonas) < Castellani's paint  
0.25% acetate (علاج)

• Add for Topical (##) < DermCure (Keratolytic) for  
CS (Lotriderm) Scaly Hyperk.  
 Vesicle bullae.

(Systemic IT)

• Griseofulvin: 2-4ws (نور)

• Sporanox: 1 Caps / d for 1m  
 2 Caps / day for (2ws)

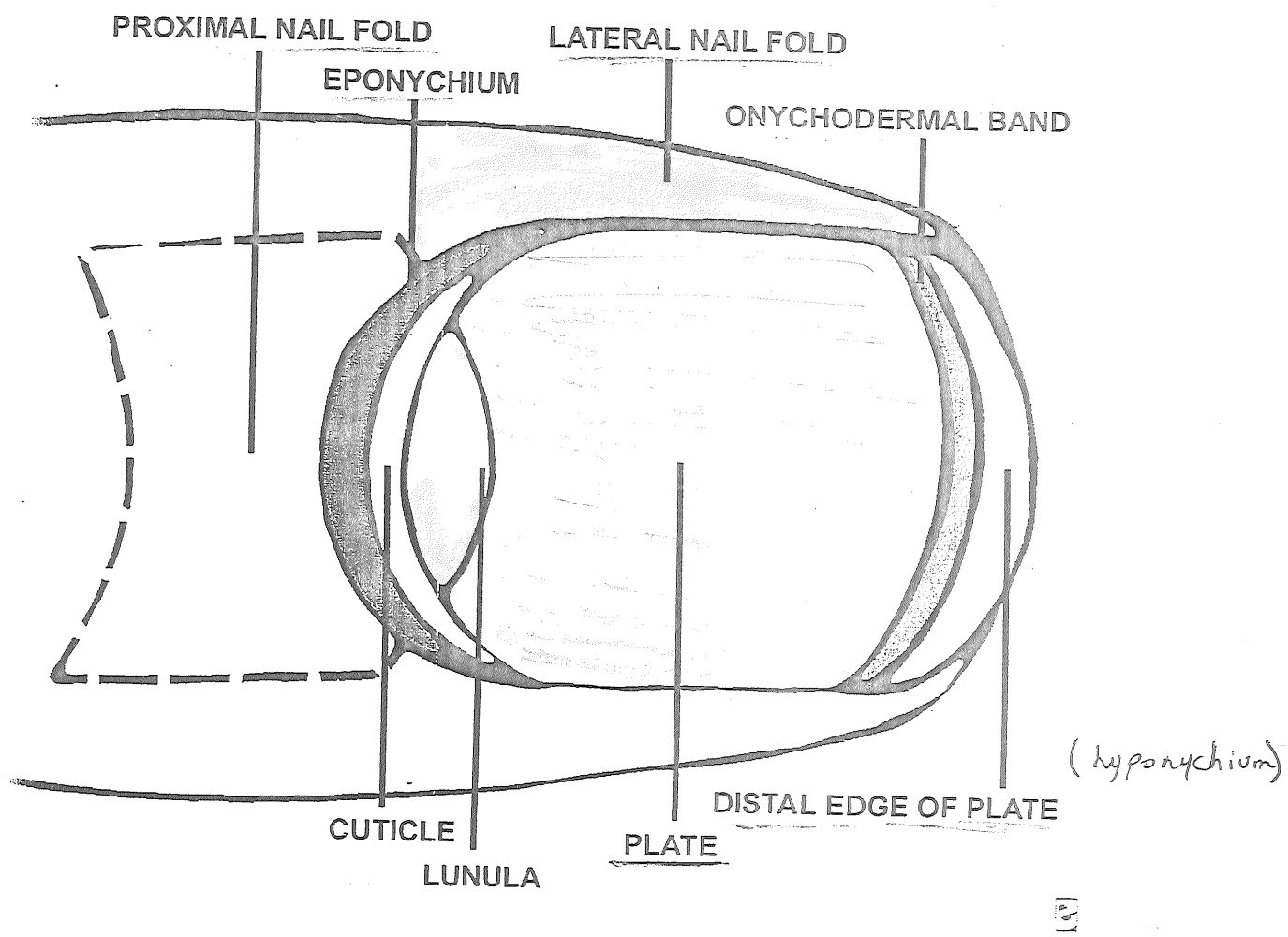
• Lamisil: 1 tab (250mg) / day for 2ws-6ws

• Flucan: 1-2 Caps / w for 4ws-6ws

20

# ONYCHOMYCOSIS

(Simple introduction to nail anatomy)



# Onychomycosis (OM) (2010)

Def. <sup>any</sup> Fungal Infection of Nail Plate, Bed & Matrix, caused by

1. Dermatophyte moulds,
2. non " moulds or
3. Candida.

Note: Tinea unguium is "dermatophyte" infection of Nail <sub>only</sub>

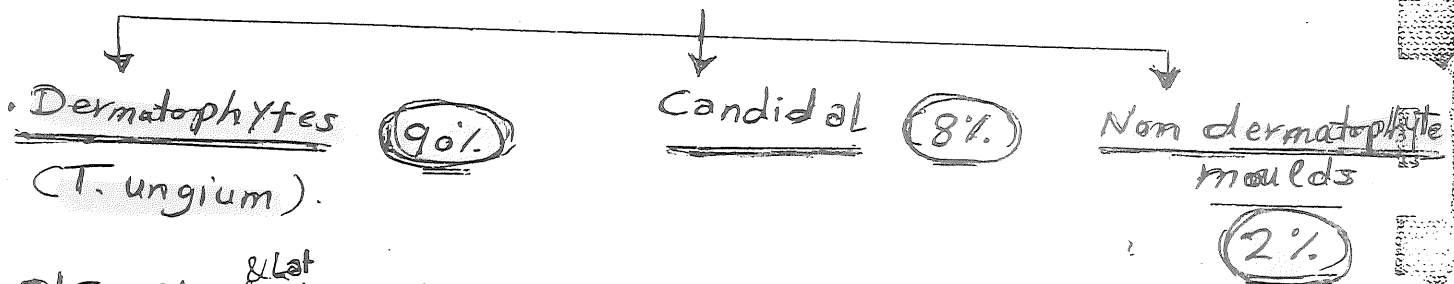
Q. difference bet. onychomycosis & T. unguium??

- AET
- ① UK & USA  $\xrightarrow{\text{فالت}}$  Dermatophytes ( $\sigma > \rho$ )
  - ② Middle & Far east  $\xrightarrow{\text{فالت}}$  Candida. ( $\rho > \sigma$ )

## Epidemiology:

- usually affect the Toe Nails (80%) > Finger Nails
- Toe Nail onychomycosis is usually d.t T. pedis
- Risk group:
  - ① old age > 60 ys.
  - ② Smoker.
  - ③ ImmunoCompromised e.g HIV, CS & DM.
  - ④ peripheral vascular dis = (pvd), ⑤ Hyperhidrosis & T. pedis.

Classification: According to the organism:



1. DLSO (distal <sup>& Lat</sup> subungual)
2. PSO (proximal " )
3. WSO (White superficial)
4. ENO (Endonyx)
5. DYSTROPHIC O. M

6. FAVIC (see T. Capitis)

# Dermatophyte onychomycosis

(T. unguium)

(27)

## Types

### 1- Disto-lat. subungual OM (DLSo) (T. rubrum)

- Commonest Type in ImmunoCompetent
- Infect<sup>n</sup> starts at Keratin of lat. <sup>Fold</sup> & for distal Nail bed (Hyponychium) → Nail bed, Nail plate & Matrix Inf. → :

- discolorat<sup>n</sup>
- Ridging
- Thickening
- Subungual Hyperkeratosis
- onycholysis ← (separation of nail bed & plate)

Accumulation of Keratin under nail plate

### 2- proximal subungual OM (PSO) (T. Mentagrophytes)

- Commonest Type in ImmunoCompromised (HIV) & Candidal Inf.

- Inf starts at proximal Nail fold Keratin → enter through Cuticle → Under surface of Nail plate & Nail bed then Matrix

- CIP: leukonychia : single or Multiple, Transverse over the lunula

- Subungual Hyperk ←
- proximal Nail plate destr. & onycholysis

Intact, smooth dorsal surface of !! plate

### 3- superficial white (SWO): (T. Mentagrophytes)

- rare
- Invasion starts at dorsal surface of the plate
- CIP: Leukonychia (speckled, friable, well defined) → white crumbled plate

#### 4. Endonyx: (T. Soudanensis) منطقة السودان

- infects starts bet. Nail plate lamellae;

So  $\left\{ \begin{array}{l} \text{No Bed effect} \text{ (-ve Inv.)} \rightarrow \text{No Subung.} \\ \text{No dorsal plate effect.} \end{array} \right.$  Hyperk. & onycholysis.

- Clp: Leukonychia.

#### 5. Total dystrophic OM (TDam) (extensive)

- Total destructo of all Nail units.

- represent the end stage of other Types (Except in CMC w ± 1ry).

organisms of OM :-

- T. rubrum (70%) the Commonest  $\rightarrow$  also

- T. Mentagrophytes (20%) Common in WSO)

- Epid. floccosum. (1%)

1ry Invasion  $\rightarrow$  Rate of Inv. أسرع في الانتشار  
2ry  $\checkmark$  في الانتشار

**Candidal OM (8%)**

Candidal Paronychia  $\rightarrow$  Candidal OM (thickening, ridging & Beau's lines onycholysis)  
منطقة nail plate

**Non-Dermatophyte Mold OM (2%)**

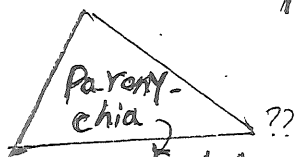
organism: **Aspergillus** فطر  
**Hendersonula**

**Scopulariopsis brevices.**  
**Scytalidium & Fusarium**

✓ Affinity to inf. diseased (Dermatophytic) & Aged Nails

Clp: As Dermatophyte OM but suggestive Fracture  
Features are:

1. PNF  $\rightarrow$  affect  $\propto$  Transverse plate Proximal nail fold
2. Lat. NF  $\rightarrow$  Cheesy material & Burrow منطقة
3. Brown discoloration of subungual Hyperkeratosis منطقة



- Candidal  
- Non-Dermatophyte Mold.

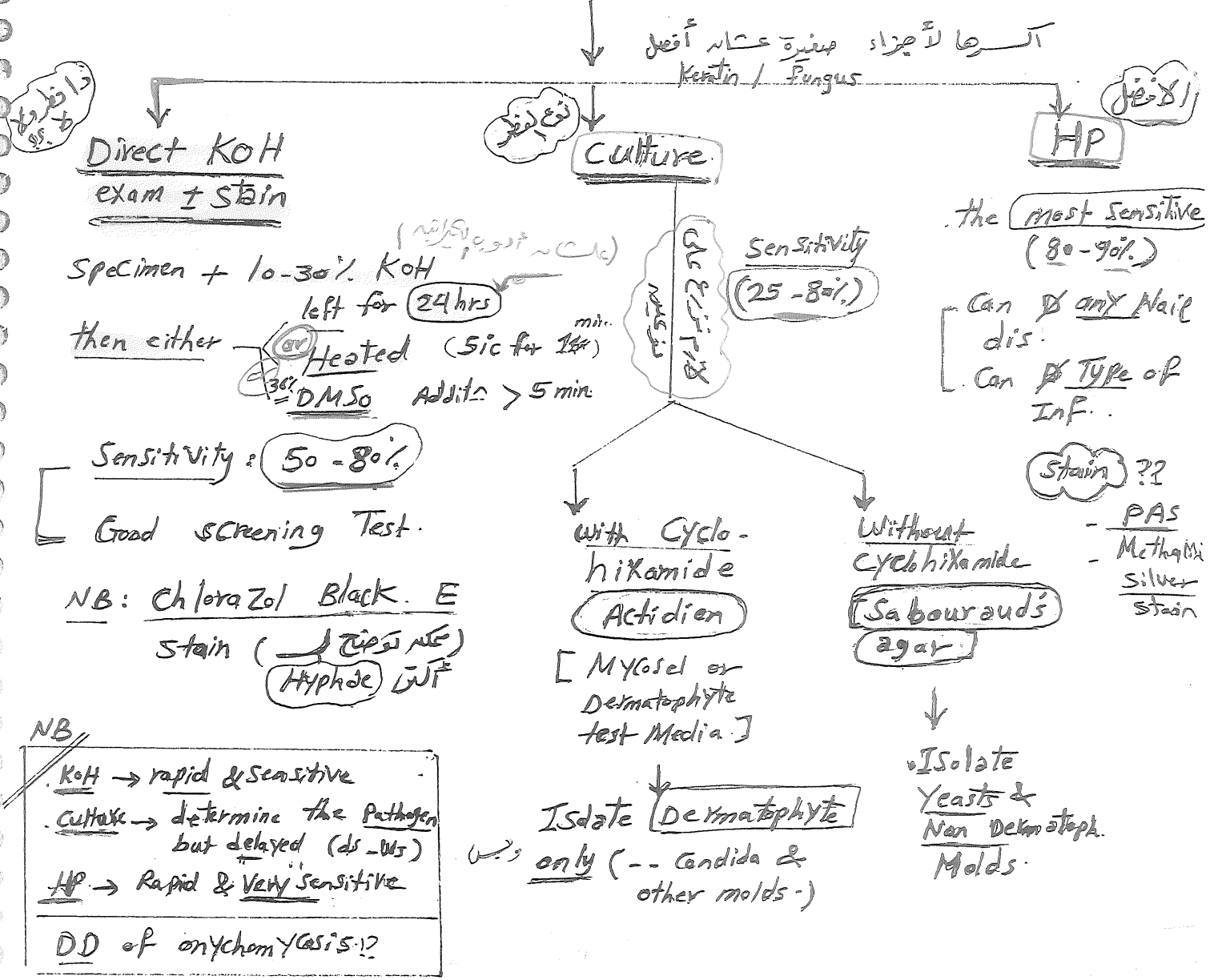
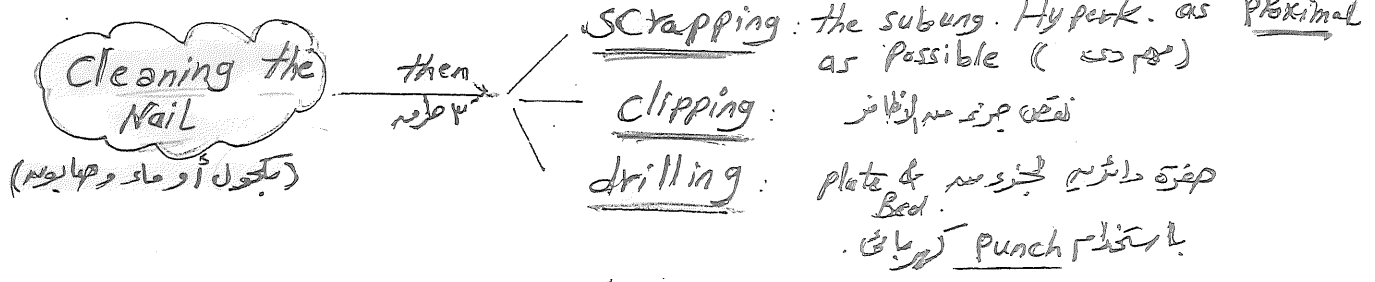
$\rightarrow$  Nail fold affection



NB (31)  
 No # of OM  
 without investigations

1. Specimen Collectn
2. KOH exam.
3. Culture
4. HP
5. PCR

Specimen Collectn  
 (تجميع العينات)



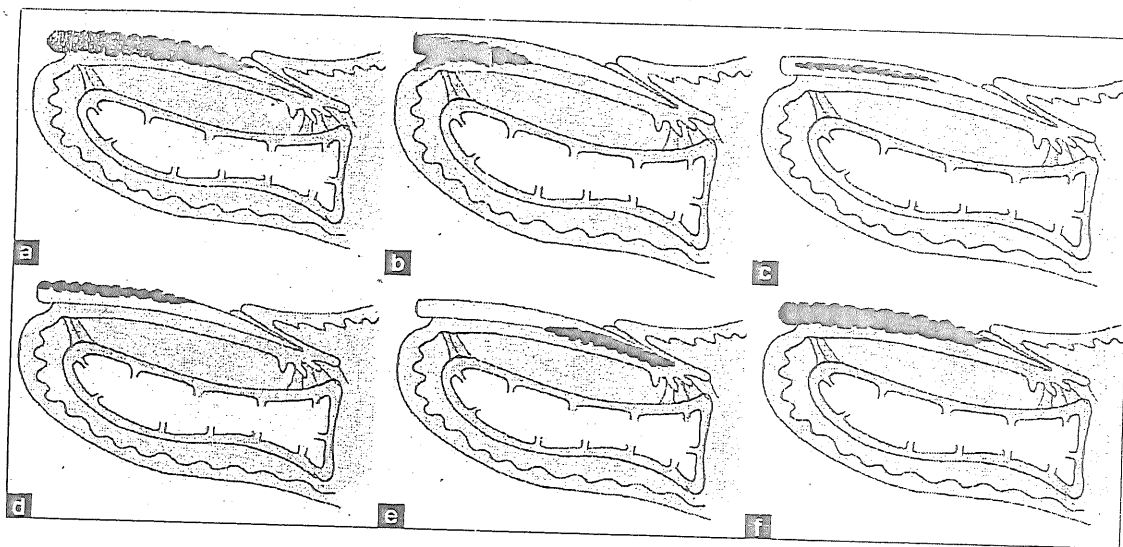
NB

KOH → rapid & sensitive

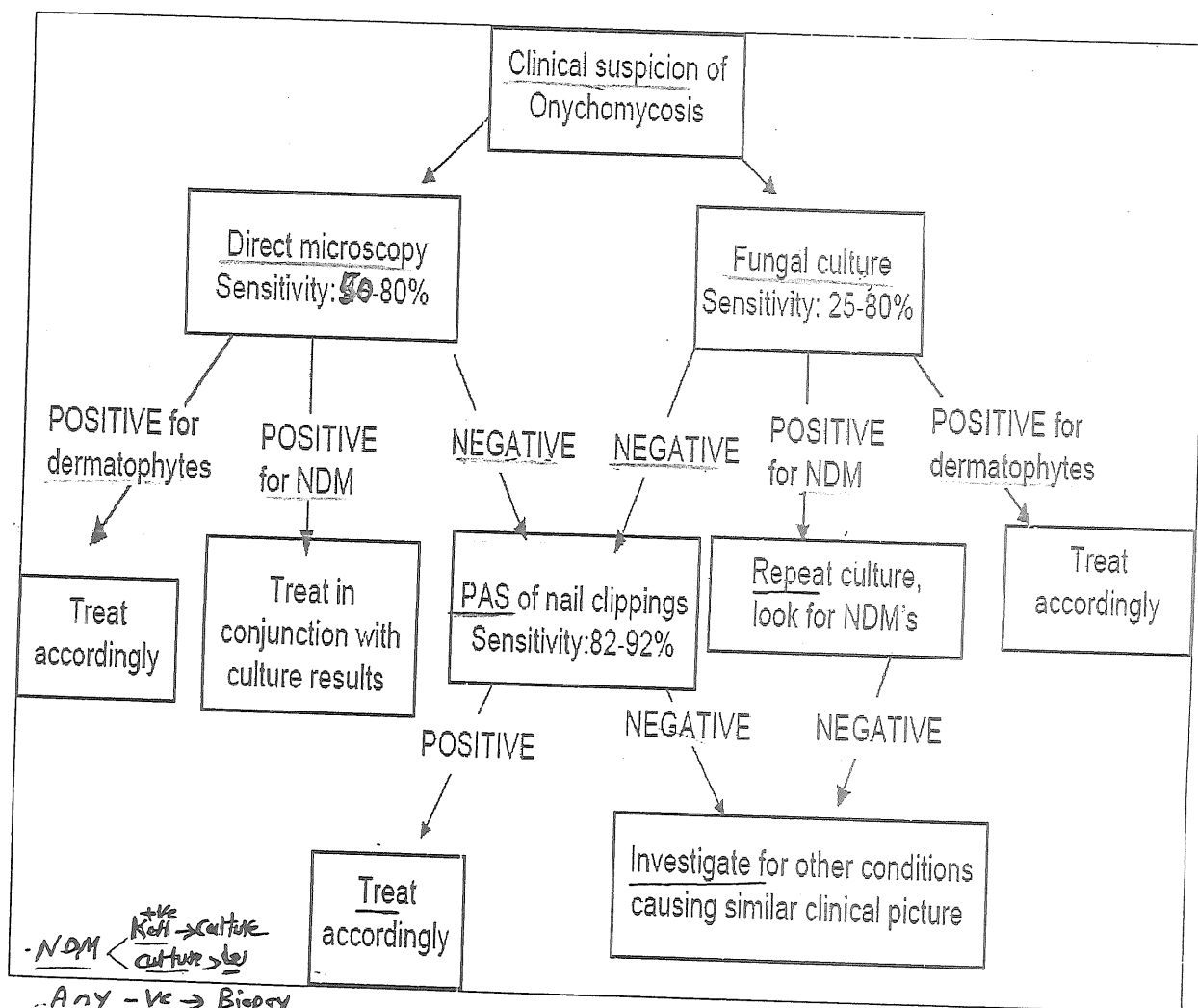
Culture → determine the pathogen but delayed (ds - Ws)

HP → Rapid & Very sensitive

DD of onychomycosis?



Pathogenesis of Onychomycosis. (b) Pattern of fungal invasion in distal lateral subungual onychomycosis. (c) Pattern of fungal invasion in endonyx onychomycosis. (d) Pattern of invasion in superficial white onychomycosis. (e) Pattern of invasion in PSOM. (f) Fungal involvement in a case of TDOM



### Treatment of OM

طالات مودة Topical

Systemic

لا شئ منه Surgical

- PDT

- laser

- prevention of recurrence.

Indication:

1. Mild inf. < 5%.

DLSO (Very distal cases involve < 1/2 Nail)

WSO  
No Matrix affect.

2. Adjuvant with systemic

3. Contra indication of // e.g. hepatic, pregnant

4. prevention of Recurrence (Maintenance).

NB: it has mild effect (d.t) Poor penetration.

the following are the only effective

1. <sup>olamine</sup> Ciclopirox (8%) in Nail Lacquers <sup>زيت وريش اطلاق</sup> - <sup>battachin in liposome</sup> <sup>↑ penetrat</sup>

مع امر بكا

2. Amorlofin (5%) in Nail Lacquer:  
(Allylamine)

دهانه مع اسبوعيا

3. Naftifen (Exodril lotn) <sup>من مرتين يوميا</sup>

4. Biofenazole 1% / urea: 2 phases:

(Biofenazole - MYCospore)

(A) 2 wks: MYCospore + urea 40%

دهانه بغطى لمدة 2 ساعة ثم يتم كبت اظفار ويكرر لمدة اسبوعين

(B) 6 wks: daily MYCospore

5. Trosyd Nail Sol. (28%) or (Fungibacid)<sup>(R)</sup>

محكمة في الحياة

NB: Ciclopirox (8%) in Lacquer →

محكمة لتتدم بدلا منه  
Ciclopirox 8% in Liposome (ظريه)

FDA (2014):

5%

1. Tavaborol (Kerydin)<sup>(R)</sup> 10 t.

2. Efinaconazole 10% (Jublia)<sup>(R)</sup> → once daily

يلكي آوة

## 1- Ketoconazole & Griseofulvin:

Not used in XX

- Low efficacy
- Many S.E
- Prolonged duration
- High Relapse Rate

1-2 gm/d until become NL

inv. for liver → Need Continuous Lab. monitoring

## 2. Fluconazole

لا يستخدم في XX

- effective against all organisms
- 1-3 Caps / w For < 6ms Finger Nail inf. 9ms Toe Nail.
- Not FDA approved & No sufficient studies.

(FDA) approved

## 3 Terbinafine & Itraconazole:

the Main & the most effective in HT of OM.

Terbinafine daily

Itraconazole pulse

- dermatophytes (good)
- Non Molds (+)
- Yeast

Effective against All Derm. (Terbinafine) Non dermatoph. Candida

Because Most Cases are due to Dermatophytes

Terbinafine is more effective

Cost effective - than Itraconazole. Less S.E less interaction.

Lamisil® More better than Sporanox®

if OM is Candidal or non Der. matophyte molds → Sporanox Preferred.

المرضى الذين يعانون من

# The most effective Regimens:-

(35)

①. Terbinafine   
 Continuous: 250 mg/d For < 6-8 wks Age  
 pulse: 500 mg/d for 1 week →  
 Rest 3 wks → Repeat for 3-4 pulses.

②. Itraconazole   
 Continuous: 100 mg/d For 3-4 ms  
 pulse: كبسولة صباحاً + كبسولة مساءً \*

Finger: ② pulses  
 Toe: ③ pulses  
 ← لثة، ربيع ← راحة، أربع ← كثر، خمسة

③ Sequential Pulse: one Itraconazole pulse 3 wks → Terbin. pulse.

NB

Continuous Lamisil → أفضل → Pulse.  
 pulse Sporanox → أفضل → Continuous  
 the most effective Courses: بالترتيب

- Continuous Lamisil → الأفضل على الإطلاق
- Sequential. و المرحمن
- pulse Lamisil
- pulse Sporanox
- Continuous "

"continuous"

\* LFT  
 \* RFT  
 \* CBC → When using Lamisil or Sporanox: For > 1m  
 → do Routine LFTs, BUN, S.Creat. & CBC lamisil

عند بداية → When using Pulsed Lamisil or Sporanox: LFTs indicated

- Hx of liver dis.
- AbNL base line LFT
- S. & S. suggest Liver impairment.

# Surgical tt (Nail Avulsion)

36

• Surgical Avulsion  
مؤله للجراحه

• Chemical Avulsion  
مكنه تجله انت

Urea 40% → توضع على اضاف  
وينطق ليله (أربع - 10 أيام) ←  
بعدها Carrotage by bone spatula.

• Avulsion: is a good adjuvant tt

Combination of: Topical + systemic + Avulsion

Best Results

• don't forget to follow up for ReCure  
T. Pedis.

① Laser tt of onychomycosis:

- Type of laser: Nd-YAG or Fractional CO<sub>2</sub>, Diode 980
- Mechanism
  1. direct fungal killing by heat
  2. Selective photothermolysis: absorption of Laser by Melanin of T. rubrum
  3. Creation of columns (by fractional):  
direct fungicidal effect.  
Facilitate penetration of other drugs.

- فداعا انعود :
- ①. investigate before tt initiation (Biopsy जर)
  - ②. use: Continuous terbinafine + Topical + Avulsion

# Candidiasis (Moniliasis) (38)

Def: Dimorphic organism that present into 2 forms:

- ① Commensal (Yeast) form in
  - GIT
  - Vagina & Rectum
  - Mucocut. areas
  - Intertriginous areas.
- ② Pathogenic (Mycelial) form.

Types (> 150) Urine (المسحوق - البول)

Most

① Albicans (Commonst 8%)

② Tropicalis

③ pseudo tropicalis } (20%)

④ Krusei

⑤ Glabrata (No pseudo hyphae)

⑥ Torulopsis

(Vagina فيس)

[Albicans  
Glabrata]

Predisposing factors for inf: "أى"

① Lack of Bact. flora:

- Prolonged antibiotics (chronic infection)
- Neonatal Mouth (فم المواليد داءاً)
- ↑ Glucose in Saliva & fluids → bact. will  
Not -- Yeast (as in diabetics) (immunity)

② Local tissue damage:

(break of surface epith)

✓ Wearing < denture  
Tight Nylon

• Continuous Friction

[chr. maceration, Moisture  
Humidity, Excess Water Exposure]

Immuno Supp. II → ③ ↓↓ CMI: Leukemia, Lymphoma, HIV, Cushing & DM

④ ↑ Serum Transferrin in Newborn Leukemia → Ⓢ Fe level → ++ Growth

⑤ Pregnancy & ocp: ↑ oest. → ↑ Glycogen → ++ growth



# Clinical Picture

(40)

Candida May infect: \* فطريات الخميرة .. بآفات جلد

① SK in:

③ Intertrigo  
Interdigital  
Napkin

④ C. Miliaria  
C. Folliculitis  
C. granuloma

Nipple Candida

② Mucous Memb.:

فطريات الثدي  
شق الثدي  
والثديتين  
والتي لا ينبغي وجودها

Genital   
 Balanoposthitis  
Allergic Reaction  
Vulvovaginitis  
Dysuria & dyspareunia.

Oral : Thrush. Neonate

Angular Cheilitis  
Candidal Cheilitis

Acute Atrophic  
Chr. Atrophic

Candidal Leukoplakia  
Black hair Tongue.

③ Nail → Candidal Paronychia & Onychia.

④ Systemic inf.

⑤ Others: 3C (Candidid & CMC & Cong. Cut.)  
Candidiasis.

C. Intertrigo: ch-

- moist, fiery red erythema.
- Well defined "Fringed" border
- Sub Corneg Pustules → Rupture → "Tiny Erosions"
- Papular or pustular Satellite lesions (Fore-runners)

Perianal Candidiasis : May be presented by either:

① Features of Candida Intertrigo

② Severe Nocturnal burning pruritus And

③ Capsin (33)

- Causes of pruritus ani
- Parasites
  - Atrophy
  - Progenetic factors (NB)
  - Antibiotics
  - Direct chemical irritation
  - Normal bacterial flora
  - Hemorrhoids, fissures & fistula (Common)
  - Intestinal bowel movements
  - Excess moisture ✓
  - Underpants (Tight)
  - Hygiene (Poor)
  - Stress (Oxyurias) → children

(Toe Web inf.)

pruritic, markedly macerated lesions & white scaly borders.

Commonly: bet Ring & middle fingers (dit common tendency)  
E-V bact: may be Co pathogens

## Diaper (Napkin) Dermatitis

DDQ

### Irritant Napkin Dermatitis

Infant: 6-12 ms (تحت الحفاية)

Adult: if there is incontinence

2 Factors → Diaper  
Wetness (Feces & Urine & their enzs)

Dermatitis →

1. Erythema

2. Erosions

3. Ulceration & Erosion & elevated

4. Dermatitis of Penile tip →

Urinate more frequent &

hematuria

5. Granuloma Gluteale Infantum:

Erythematous - violaceous, ovoid nodules at anogenital area as complication of Napkin D. predisposed by:

Cs  
occlusive plastic  
Pants  
Candida

→ Folds are: Free (any)

Usually Colonized by Candida & Staph.

→ CD

(CS) → Jacquet erosive Napkin  
Mebo / Naprix

### Candidal Napkin Dermatitis

chic picture of Candidal intertrigo (see before)

to diff. from irritant Napkin

(2F)

Folds affected ✓

Forerunners or daughte = satellite

### DD of Napkin Rash

1. Irritant Napkin Dermatitis
2. Candidal "
3. S.D
4. Psoriasis
5. Acrodermatitis Enteropathica
6. Histiocytosis
7. Kawa-Saki
8. Leiner's dis. → diarrhea chronic

Any case of irritant Napkin Dermatitis should be colonized & Candida within 2 days

So the H of Both Conditions are the same.

### NB on Infantile gluteal Granuloma:

- Self limiting after removal of predisposing factors.
- Path. ranging from non specific to Vascular malformat<sup>n</sup> resembling K.S

Pseudo verrucous papules & nodules entity in children & urostomies & encopresis that has feature similar to infantile glut. Granuloma.

Recurrence is common dit oral & Gut Colonizat<sup>n</sup> of Candida → Fungistatin oral

1x2 ap

1

# Thrush

- Commonest form of oral C.
- usually affect: ① Newborn: from infected Mother  
② Child & Adult: Antibiotics & Immuno-supp. e.g. HIV
- Well defined creamy white patches (Pseudomemb) on buccal Mucosa, Tongue, Gum
- When Removed → Eroded erythematous base.

There is a relationship between ↓ CD4 count, oral thrush and ↑ rate of progression to AIDS

< 3

2

## Angular Cheilitis (Stomatitis): Perleche

- macerate & Transv. fissures at oral Commissures.
- AET → Excessive wetness or dryness often complicated by staph. & Candida

فقر فيتامين ب ٢  
انخفاض  
قد يربط

- Main factor: excess wetness or drying
- 1. ill fitted denture
- 2. Lollipop cutters
- 3. Senility
- 4. Netbook (for acne) → drying SE

Complicated by Candida, staph & strept.

- Other Contributing factors
- 1. Riboflavin def
- 2. Fe & folic acid def
- 3. HIV/ Down
- 4. Anorexia Nervosa

- 1 - Cause Removal (فصل)
- 2 - Nystatin + Idochlorhydroxyquin (Virgim) in hydrocortisone → effective
- 3 - Mupirocin: if staph.
- (علاج مع saliva) دواء زكومييل قبل النوم + Dakta Cort. Cream

لا تأكل الحامض (acid) ١ (2.0) → اكل عازل

3 Candidal cheilitis: → as angular ch. but affect Center of lower Lip.

4. Acute Atrophic (Glossitis): Sore, Tender, Red beefy Tongue

affect Elderly Taking (CS or antibs)

5. chr. Atrophic (Denture Stomatitis): patch of Erythema in denture Wears.

6. chr. Hyperplastic (Candidal Leukoplakia): White, adherent, firm plaques (doesn't rub easily (as thrush))

- affect smokers
- ?? Mg Transformation

# 7. Black Hairy Tongue:

(13)

6

- Oral candidosis in HIV**
1. Erythematous "atrophic".
  2. Pseudo-membranous
  3. Hyperplastic →
  4. Angular cheilitis.

**Aet** +   
 Candida  
 Antibiotics  
 Smoking

**Site** Ant.  $\frac{2}{3}$  of Tongue.

**C/p** patches  $\leftarrow$  yellow, brown, or Black   
 with "hair like inter-wining filaments"

**Path** Bg hyperplasia of Filiform Papillae & ortho-keratotic & parakeratotic "Cell Retention" → hairy appearance.

**Oral Hairy Leukoplakia** (caus = **HIV**) others  $\leftarrow$  Behcet ulcerative colitis

**Def:** EBV inf. of Tongue of HIV patients & Renal Transplant.  
**Site:** Lat. edge of Tongue   
**C/p:** Corrugated, Vertically placed, whitish plaques (that) can't be Rubbed off. (Asympt) (مخاطباته)

## (Treatment)

**Black Hairy Tongue:**

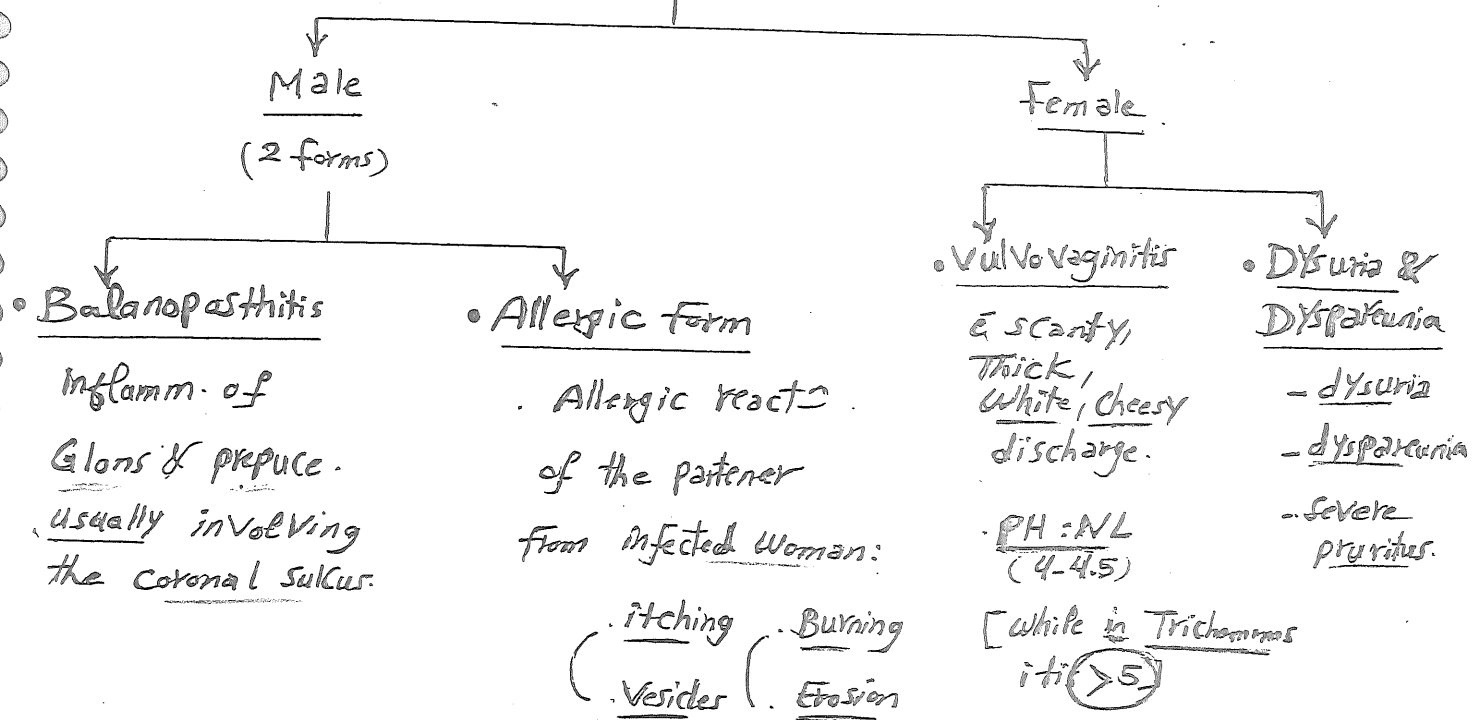
- stop predisposing factors  $\leftarrow$  Smoking AB
  - Retin A
  - 40% Urea
  - 1-2% H<sub>2</sub>O<sub>2</sub>
- In mouth brush

**oral Hairy Leuko**

- ⊙ HART
- ⊙ ACV, VCV, GCV
- Zidovudine
- didanosine
- Tretinoin
- Excision
- ⊙ Gentian Violet

قرصه الأسنان على لسانه

## Genital Candidiasis



## ReCurrent Genital

Candidiasis is >3  
episodes / y.

کسیوں نے فلو کی ان کل سیٹی (۱۱۱)۔  
 ۱۶۷ ہوتے  
 بح کسیوں نے جو انوکس کل ۶۷  
 ۱۶۷ ہوتے

Recurrent  $\rightarrow 3/4$

بعد اجتماع مبارك

Dramatic response

✓ Hydrocortisone is characteristic

NB: ∴ Resistant inf in ♀ may be caused by C. Trichomonas &  
Not Albicans → resistant to Azole Antifungal but  
responsive to: Boric acid lot - Amphotericin - Flucytosin  
Treatment of Genital inf in ♀:

- 1- Systemic: - Fluconazole 50mg ✓ أقل  
- Itraconazole 100 (فليركس 100)  
- Ketoconazole: 1X1X10 days

2. Topical: • Miconazole: 1200 mg Vag. tab single dose (<sup>mtc</sup><sub>12</sub>)  
 (MBC)  
 • Econazole: 150 / Night for 5 ds  
 • Clotrimazole: 100 mg / N. n 7 ds.
- ↓  
Topical
- diol syst → hidden areas as parathyroid glands (37)

# Systemic Candidiasis

(45)

219

Affect Patients =

- Leukemia: source of Candida is Gut ✓
- Addicts: " is IV ✓

Δ Triad of

- ① Fever
- ② Diffuse muscle tenderness
- ③ Erythematous papulonodular lesions ± pale center

// NB //

① Cong. Cut. Candidiasis:

- starts few hours after birth d.t. PROM & intrauterine candidal inf. from infected birth canal
- Maculopapular Rash → Vesiculopustules → desquamate & Resolution. Sparing the napkin & oral areas (unlike the Neonatal inf.)

② Candidid = Moritids = Candida allergic Reactn

- ± inform of:
- ① Eczema of Hands, feet & Trunk. Candida
  - ② EAC.
  - ③ chr. urticaria. (..??)

Reaction to underlying

④ disease of skin neonate within 1st 48h of life??

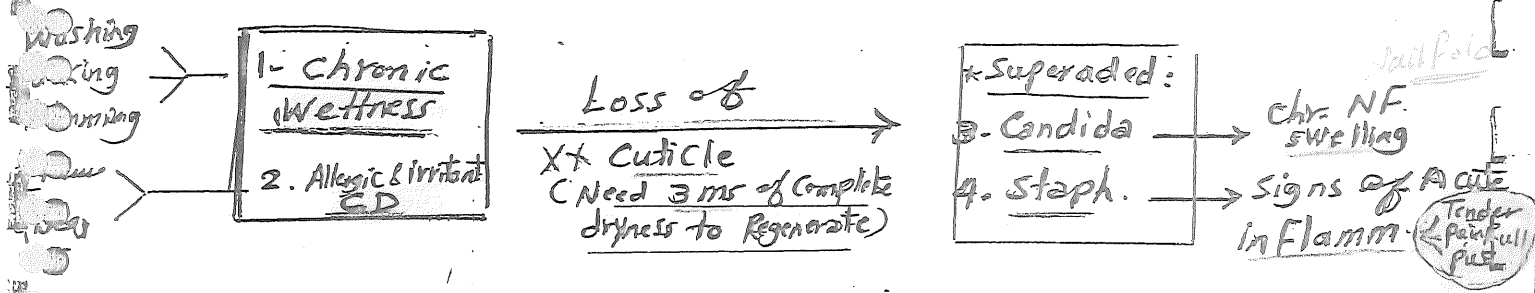
- ETN
- TnPM
- Cong cut Candidiasis

# Candidal Paronychia

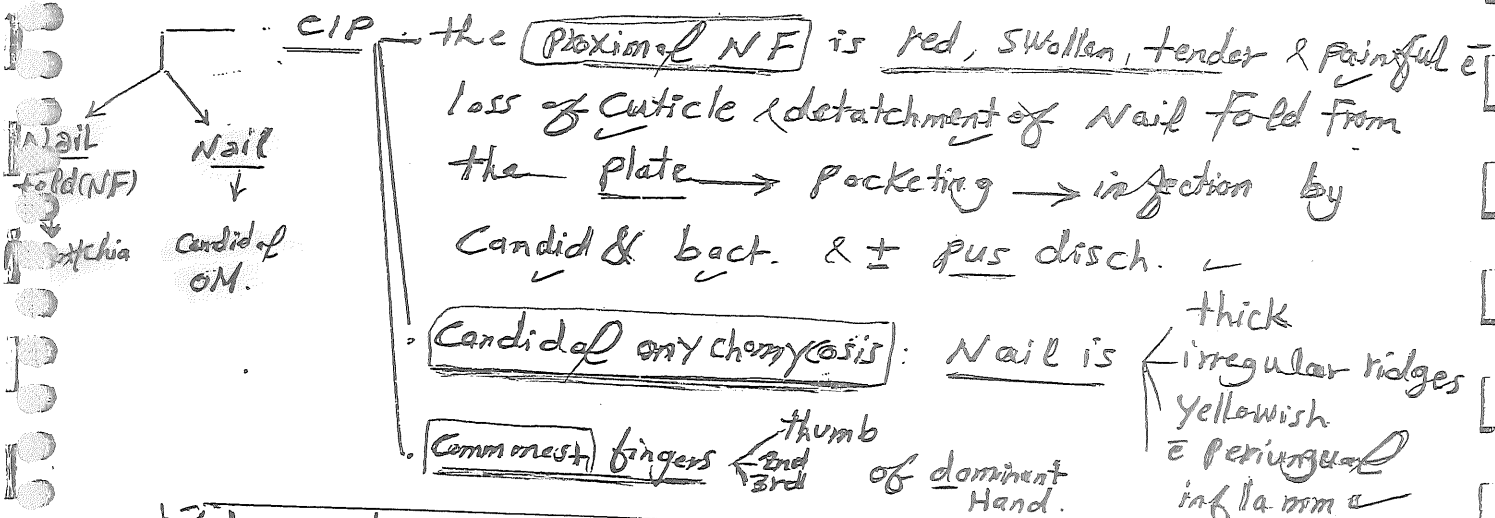
(4.7)

(Chr. Paronychia)

Recently: chr. paronychia is an inflammatory disorder of (PNF) proximal Nail folds of finger. 4 Factors



in Recent study: topical Cs more effective than systemic anticandidal (age)



Step 1: Chronic Water exposure & irritants → macerates Cuticle → infect by bact. & Candida

- \* Ht → 3 aims
1. avoid Trauma, Water & irritants
  2. suppress Inflammation → CS
  3. Candida & Bact.
- Arabic: الجراحة، المضاد للالتهاب، التثبيط  
Thymof 4ml + chloramphenicol to make 25 ml.

Combined Cs + Antifungal: Lotriderm or Pivisone C if failed systemic antifungal

\* NB on NapK in Dermatitis:

Recurrent cases ?? d.t Candidal Colonization in Gut so give oral Nystatin suspension

Arabic: علاج: oral Nystatin, Daktacort 1x2, Zincosil → (physical barrier for urine) (39)

# Chronic Mucocut. Candidiasis

48

Def: Heterogenous group of disorders ch by severe, progressive, & recurrent inf. of skin, MM & Nails by C. albicans d.t defective Immune system against the organism.

Etiopathogenesis:  $\left\{ \begin{array}{l} \text{Genetic} \\ \text{Immunodef.} \end{array} \right.$

1- defective T cell defense against Candida "Specifically" &  $\pm$  other organisms; the defect is ass. with:

Candidal Poly Saccharide  $\rightarrow$   $\downarrow$  IL2, IL12 & NK (Th1) cytokines  $\rightarrow$  immunosuppression.  
 $\uparrow$  IL6 & IL10 (Th2)  $\rightarrow$  inhibition

2- Genetic: d.t AIRE gene mutation (w encodes DNA  $\leftarrow$  expressed in Thymus  $\downarrow$  prevent autoimmune dis.  
 Transcription Factor)  $\rightarrow$  Autoimmune diseases.  
 (Autoimmune Regulator E gene)

Epidemiology:  $\downarrow$  mean (3 yrs)  
 ① Age: usually < 6 yrs (adult onset may Herald thymoma). MG or BM abnormalities.  
 ② FH: may be -ve or +ve (in APECED usually AR).

CIP: 1- Skin:  $\rightarrow$  Crusted, granulomatous, Horny plaques usually at face (Acrofacial), scalp & flexures but  $\pm$  Generalized.

$\uparrow$  Hypertrophy  $\uparrow$  site 2- MM:  $\rightarrow$  oral thrush & Hyperkeratotic plaques.  
 ③ Chr. lesions on Esoph, Larynx & Genital mm.

$\rightarrow$  Stricture. (مباغرة)

3- Nails:  $\rightarrow$  Thickened, dystrophic & Paronychia.

Also: ① Severe recurrent bact. Septikemia.

② Systemic Candidiasis.

③ others: Warts, Dermatophytes, AA, SD, recurrent Aphthae.

$\left\{ \begin{array}{l} \text{SD} \\ \text{AD} \\ \text{Alopecia} \end{array} \right.$



Types of CMC (all types affect children EXCEPT Type 4):

- ① AR CMC: : <sup>Autosomal Recessive</sup> mild Affect<sup>n</sup>, Improves w Age.
- ② AD: <sup>Autosomal Dominant</sup> Severe affect<sup>n</sup> ass w other types of Inf.
- ③ Idiopathic: severe affection (ass) with systemic Inf. & Bronchiectasis.

④ Late onset: occurs in Adults; May Herald Thymoma, MG or BM --, SLE or HIV

### ⑤ Candidiasis Endocrinopathy Synd. (APECED)

#### APECED

may be confused  
w/ at least 2:  
- CMC  
- Addison's  
- Hypoparathy.

- AR, AIRE Mutat<sup>n</sup>
- at 5 Ys (but Endocrinopathy is late at teenage or adults).
- Associated Conditions: Autoimm. <sup>Endo. cut. disord.</sup>

#### A Autoimmune - endocrinopathies:

- 40% → Hypoparathyroidism
- 60% → Addison
- 30% → Both 1 & 2
- 45% → Hypogonadism
- 15% → Thyroid disorders.
- Hypopituitarism.
- DM.

#### B Autoimmune cut. disorders

- AA, Vitiligo, LE like ✓
- Panniculitis.

#### C Other autoimmune disorders

- Pernicious anemia & CAH.

#### D Other ass. conditions:-

- Malabsorpt<sup>n</sup>.
- Chr. diarrhoea.
- Pulm. fibrosis.
- Enamel Hypoplasia
- Antithyroid antibs.
- + Rhoid factor.

#### ⑥ CMC ass w:

- ✓ Keratitis (as KID synd).
- ✓ AEP
- ✓ Iry Immuna defieny.

- CARD9 ass. CMC: CARD9 Gene Mutat<sup>n</sup> <sup>oral</sup> Vulvovaginal
- Dectin 1 deficiency: Vulvovaginal Cand. & onychomycosis.

Candidal organisms are confined to the stratum corneum and are demonstrable in scrapings and cultures. Approximately 70% of patients have direct evidence of an immunologic defect, including decreased lymphocyte proliferation *in vitro*, impaired cytokine production and absent delayed-type hypersensitivity (DTH) to *Candida*, as well as non-specific findings such as abnormal leukocyte chemotaxis or phagocytosis, depressed IgA levels, and complement dysfunction. These heterogeneous immune abnormalities reflect the variety of underlying clinical disorders. Candidal polysaccharides may act as serum factors that inhibit the immune response, and, in some patients, DTH to candidal antigens has been restored after antifungal therapy<sup>[14]</sup>.

Differential Diagnosis: systemic Antifungals  
 ↑ CMI: Hematopoietic stem cell transp., <sup>fetal</sup> Thymus graft, leukocyte Transfusion.

Treatment: Patients with CMC do not respond well to standard topical medications, and the cutaneous granulomas are especially difficult to treat. Most patients benefit from long-term therapy with systemic antifungal agents such as itraconazole, fluconazole and terbinafine. Attempts at immune enhancement are usually ineffective, although transfer factor may be beneficial to some patients with defective cell-mediated immunity. Hematopoietic stem cell transplantation, fetal thymus grafts, and leukocyte infusions have been utilized in patients with severe immunologic deficiencies. Patients should be evaluated at least annually for the development of endocrinopathies, particularly if there is a family history of CMC or APECED.

### Diagnosis of Candidiasis:

① KOH Exam: → Yeast cells, Pseudohyphae & Hyphae.

② Culture: on Sabouraud agar (no cyclohexamide) (1-3ds)  
 → Creamy, mucoid, moist colonies. MC clusters of budding.

Chromogenic Agars

① C-ID agar - C. → Blue  
 other Yeast → White

② Chromagar - Albicans → green  
 Tropicalis → blue  
 Krusei → pink

③ Pathology: - subcorneal pustules

- Yeasts in st. corneum (PAS) & dermis.

- CMC → Hyperkeratosis, Parakerat, mixed infect.

④ Other tests:

(i) Candidal prick (intra-dermal) test.

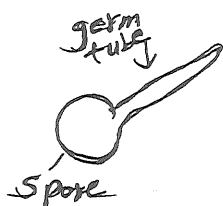
(ii) CMC → anti IFN-1α (Recent & Highly specific for APECED & may precede CMC) (2006)

(iii) Serum Tube test → Filamentous serum agglutination

(iv) Commercial Yeast Identification system as API 20c

(v) Serodiagnosis: ppt Abs that attack Mannan.

(vi) Biochemical Reacts: sugar fermentation & Assimilation.



1. Avoid any possible predisposing factors, e.g.
  - a) Better hygiene with drying and increased ventilation of the skin as frequent napkin changes in napkin candidiasis.
  - b) The use of cotton underclothes.
  - c) Open footwear in the toe clefts infections.
  - d) Removal of dentures with careful mouth hygiene.
  - e) Reduction of candidal reservoir in the gut by oral Nystatin (of limited GIT absorption, it acts by direct contact), especially in patients on systemic steroids or cytotoxic agents.
2. **Topical treatment**: e.g. Gentian violet 2%, Nystatin or Imidazoles for 2 weeks or for a week after disappearance of clinical lesions.
3. **Systemic treatment**, e.g. ketoconazole or better itraconazole or fluconazole is indicated in cases of CMC, recurrent VVC, paronychia, onychomycosis, immunosuppressed patients or systemic candidiasis.

#### Treatment of some special forms

1. **Genital candidosis** (p. 35 - STDs) ← Topical  
systemic
  2. **Oral candidiasis**
    - a) Nystatin suspension 2 ml (100.000 U/mL) four times daily. It is allowed to remain in the mouth as long as possible before swallowing. Nystatin pastilles (200.000 U) 4 times daily should be dissolved.
    - b) Aqueous gentian violet (1%).
    - c) Systemic oral antifungals may be given in resistant cases.
  3. **Chronic mucocutaneous candidiasis "CMC"**
    - a) Identification and treatment of the immunological defects, e.g. candida-specific transfer factor or fetal thymic graft or restoration of normal iron stores, or blood leucocytes infusion.
    - b) Prolonged treatment with systemic antifungals.
    - c) Treatment of any endocrine deficiency.
  4. **Oral candidosis in HIV**
    - a) Fluconazole: 100-200 mg/day for 10-14 days. Relapses are frequent and maintenance therapy is essential 50-100 mg every other day.
    - b) Itraconazole 200 mg once daily, for 3 weeks.
- Resistance to these new drugs:
- IV amphotericin B alone or together with oral flucytosine.

# Diagnosis of Fungal Inf.

(52)

11

- 1 Wood's light → سياتش بالتفحص
- 2 KOH exam.
- 3 Culture
- 4 Histopathology
- 5 others

## ① Direct Mic. Examination:



- 1st → Sample Collection
- 2nd → Mic. Examination of:
  - unstained smear
  - stained smear
- 3rd → Interpretation:

والله للى انت شايقة

### Sample Collection

(أولا نضف بكون ٧٪ وسبيها تنشف)

- Hair: Scaly T. Capitis:

رأس  
Hair  
stump  
عروة

- pluck lusterless, fluorescent hair
- Scrap for scales.

• Black dot (No Hair): → scrap

• Kerion: → hair or discharge.

- Skin (T. Corporis): → scrap from the active border

- Nail 1. Clipping: as proximal as possible

2. scrapping for subungual hyperkeratosis (as proximal)

3. Drilling (Chenopodist's drill = Vacuum Extracta)

- Moist Intertriginous & Muc cut. areas (mouth & vagina):

moist swab = saline

- Toe cleft Forceps skin Epilation.

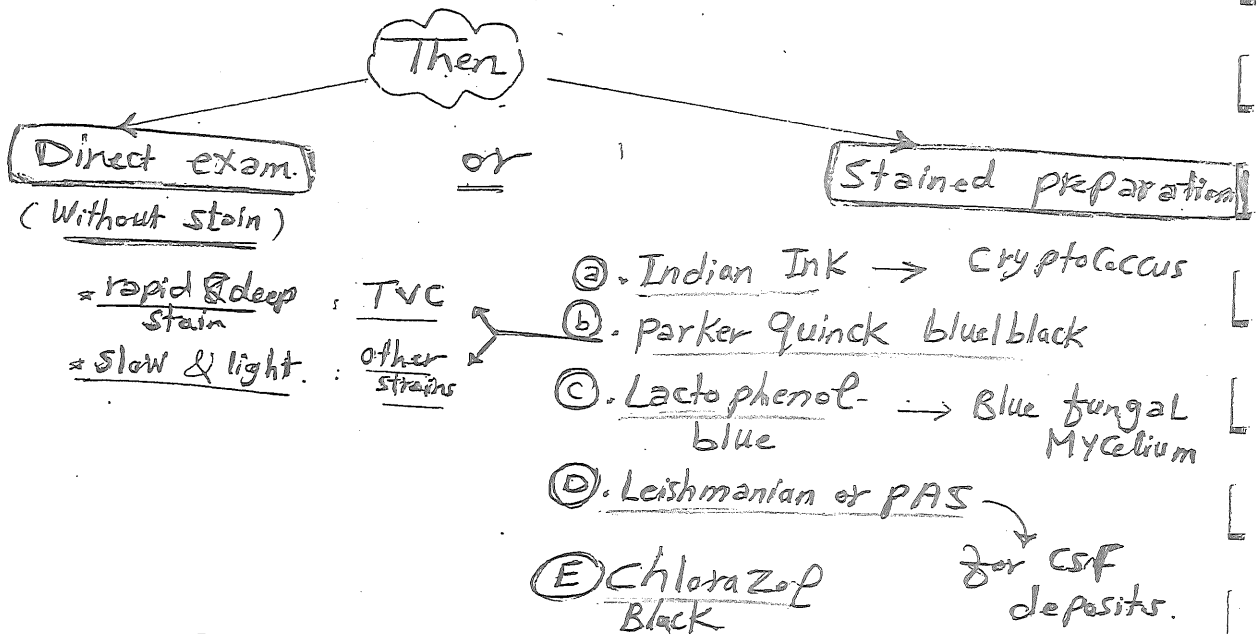
2 glass slides  
 قطع القش الكبير الى صفيحتين  
 تغطي العينة بـ (Cover slip)  
 KOH (10-30%) نقط من (11) نقط من (دقيقة)  
 انتظر لمدة (30-60) دقيقة  
 في حالة عينة الأظفار:



NB: KOH  
 hydrolyses  
 protein, fat →  
 Clear field

3 وسائل  
 Sample + KOH wait for 24 hrs  
 Sample + KOH + Heating  
 Sample + KOH + DMSO (36%)  
 Low power ← إلقاء تحت

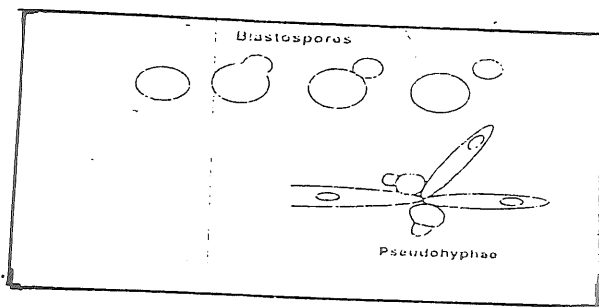
Rapid softening of  
 Keratin so will not  
 Need to wait for 24 hr.



(تأشيق) Interpretation.

① Candida:

- Budding (Blastospores)
- Pseudohyphae
- True hyphae.



③ Hair-Invasion:

- Ectothrix
- Endothrix
- Favic

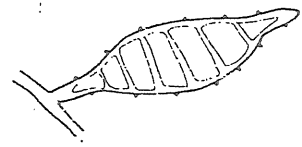
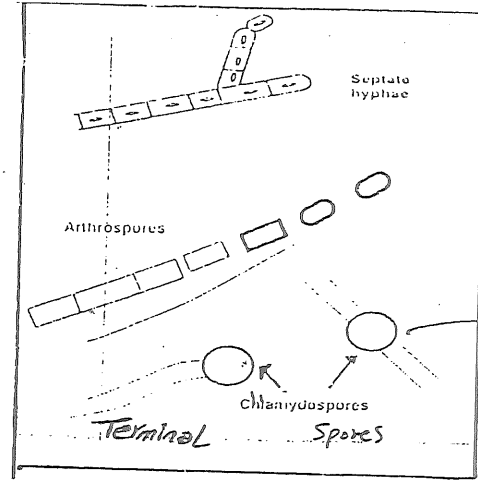
④ Artifacts:

- Lipid droplets
- KOH Cryst.
- Cloth fibs
- Air bubble & globules

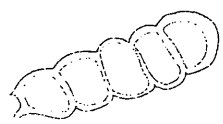
② TVC → spaghetti & meatball.

"فطير و spaghetti"

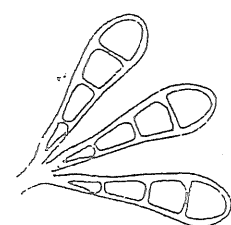
⑤ Dermatophytes  
 Branching, Septate  
 Translucent non-pigment filaments



1. Microsporum
  - Spindle-shaped
  - Thick walled
  - Rough wall
  - 5-12 septa



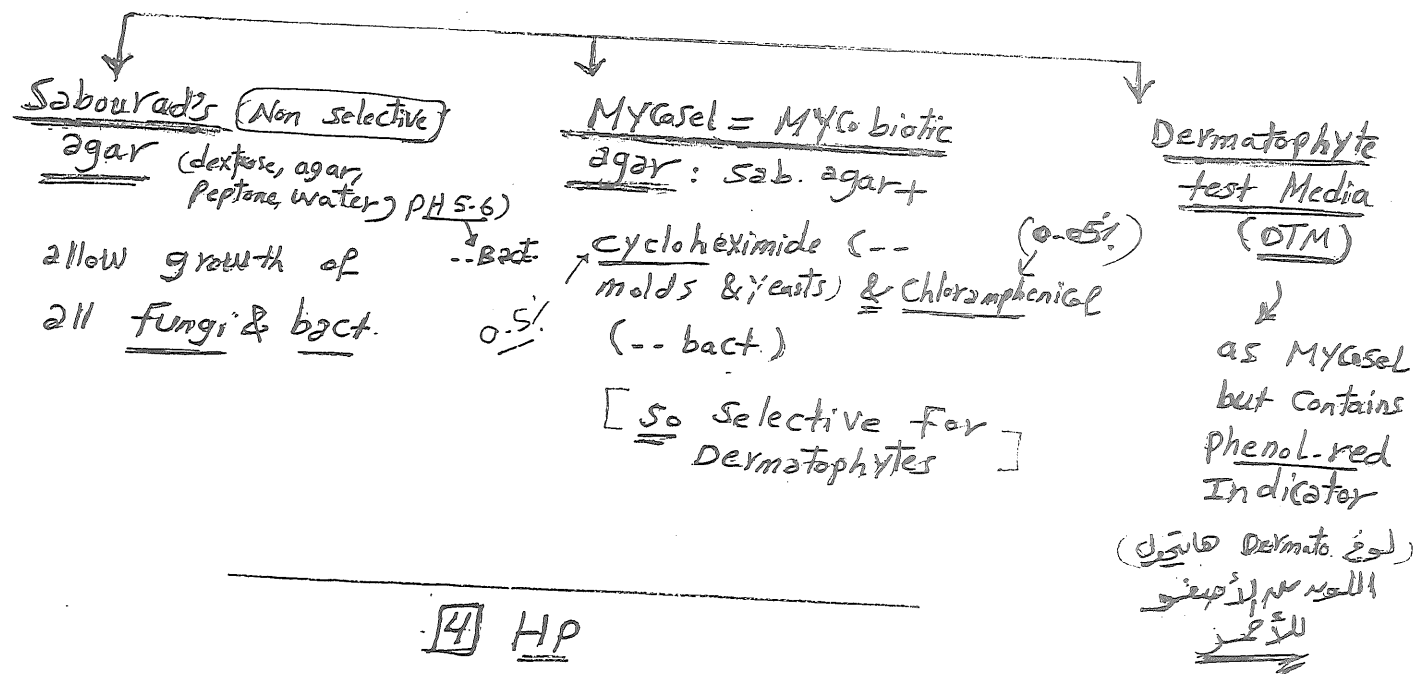
2. Trichophyton
  - Cylindrical
  - Thin-walled
  - Smooth wall
  - 4-6 septa



3. Epidermophyton
  - Pear-shaped
  - Fairly thick wall
  - Smooth wall
  - 3-4 septa

"Conidia"

### [3] Culture:



### [4] HP

Stain ← PAS or Silver

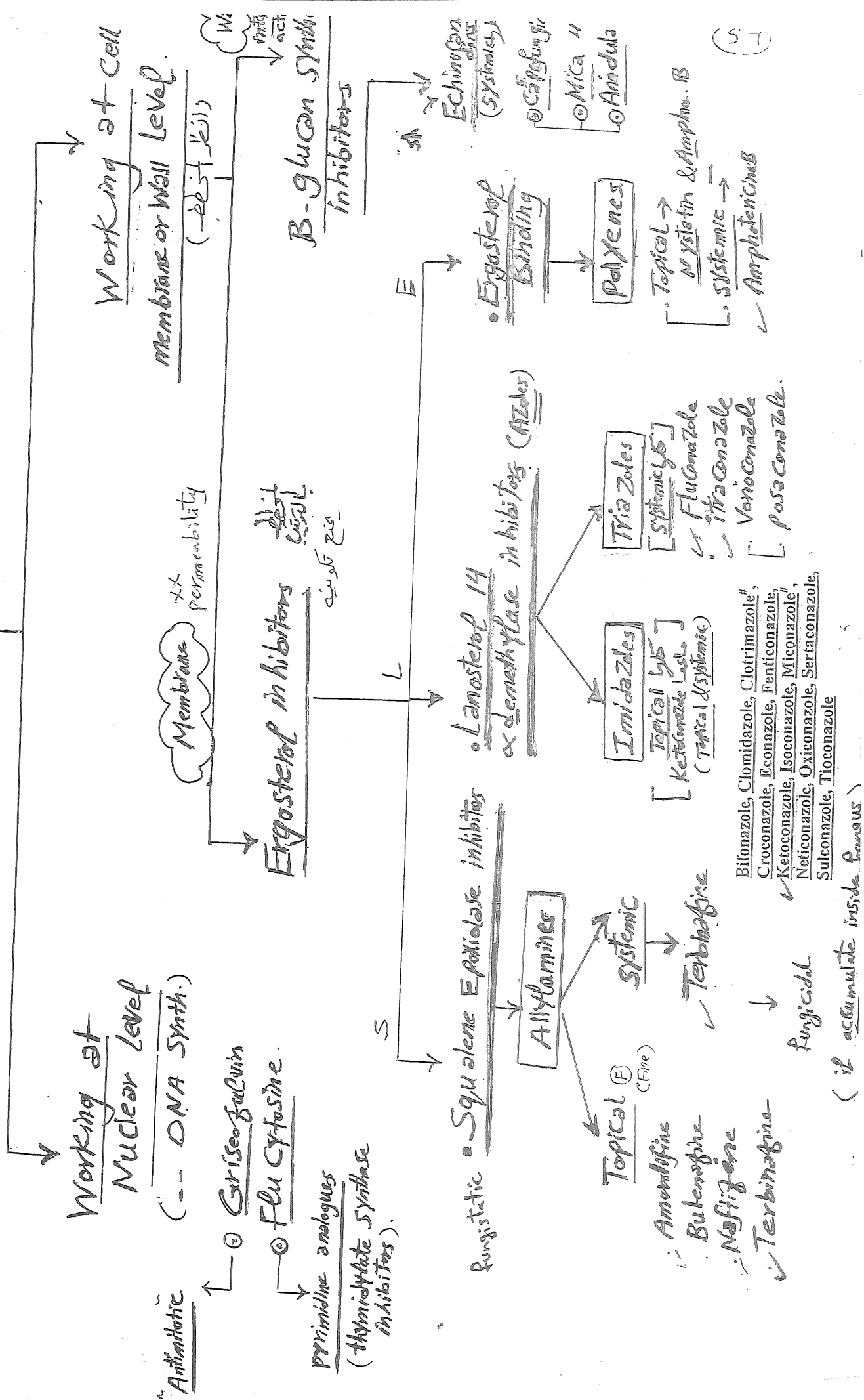
Yeasts: intracellular, have large capsule, bud,  
Hyphae  
Granules (Madura) } at. st. Corneum

### [5] others

- A. Serology → CFT & E/ISA (in deep MYCAsel)
  - B. Skin Tests → useful in nonendemic area (Dermatophytin)
- Test

# Antifungals

(Acc. to the Mechanism)



⑤

بقية

- Casp → IV for Aspergillus
- Mic → systemic candida (tft & prophyl.)
- Anidula → N N



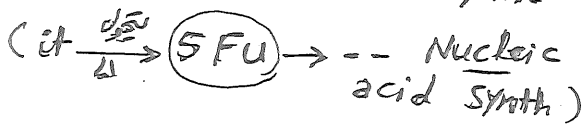
## ② Mechanism of Action:-

(53)

(4)

### Flu Cytosine

- fungal Nucleic acid synth



### Griseofulvin:-

- ① -- Fungal Nucleic acid synth
- ② dysfunction of Spindle microtubules

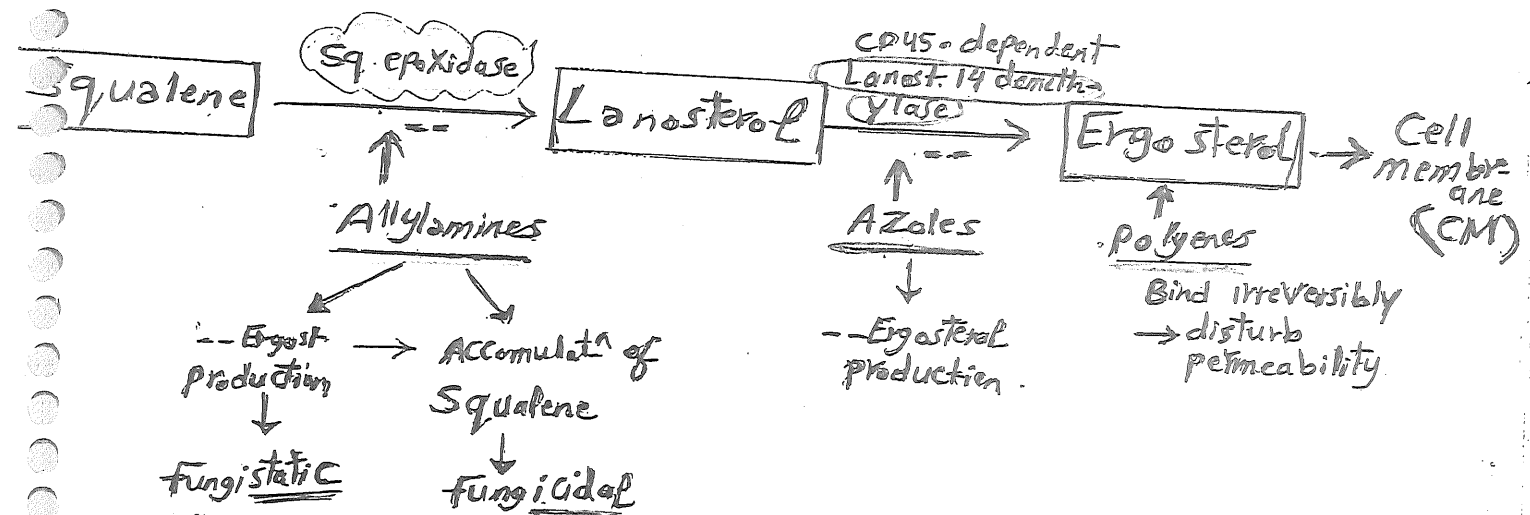
### Polyenes

binds "Irreversibly" to Ergosterol  $\rightarrow$  altering the memb. permeability. xx

### Allylamines & Azoles

### Mechanism of systemic

(up to 44)



the 2 **Azoles** **Terbin** ( -- Ergosterol production) BY -- of 2 enzs **Azole: Lanost dem** **Terb: Sq. epoxidase**

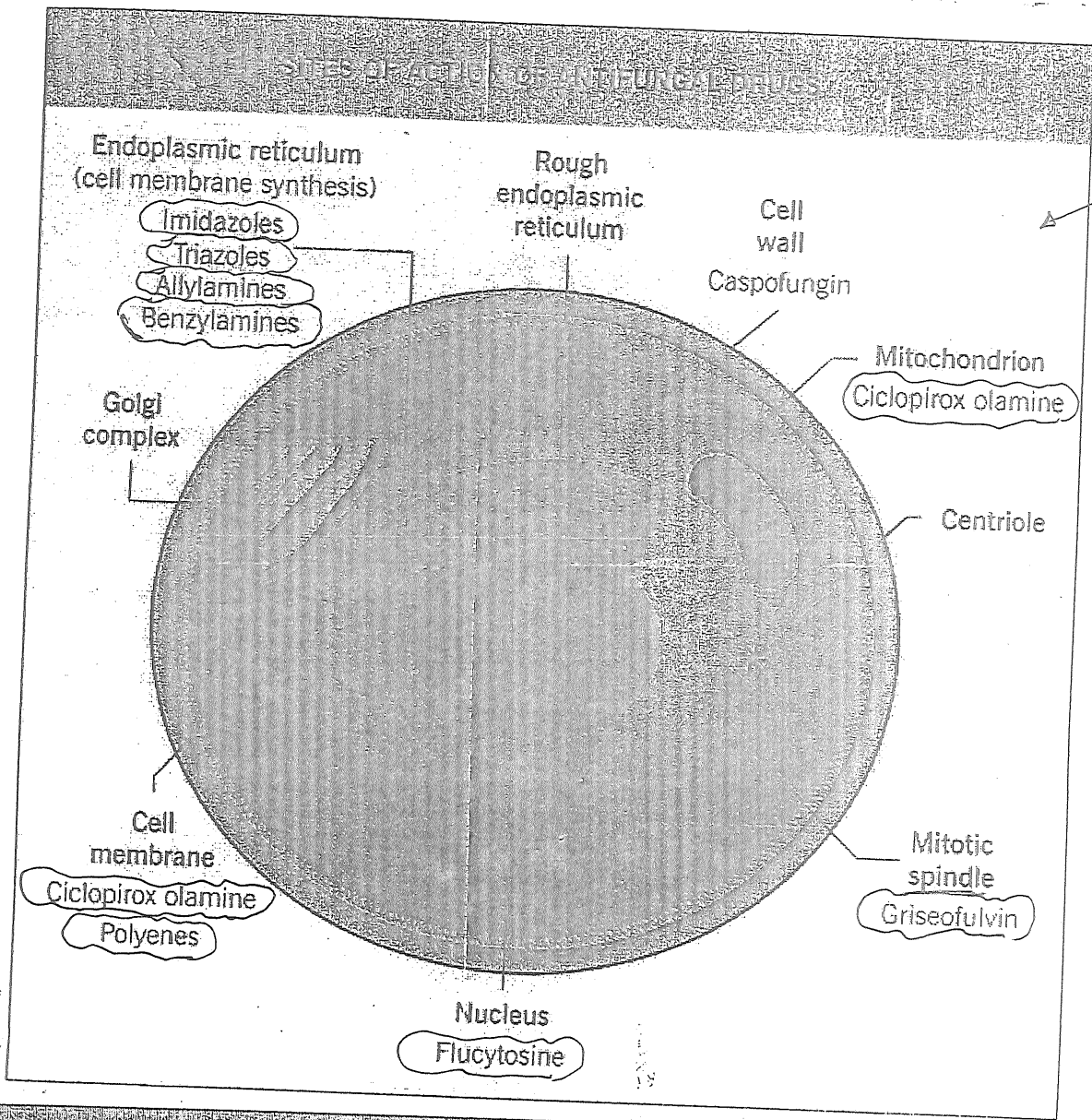
### CYP 450 present in

- Testis
- Adrenal
- Ovary
- Liver

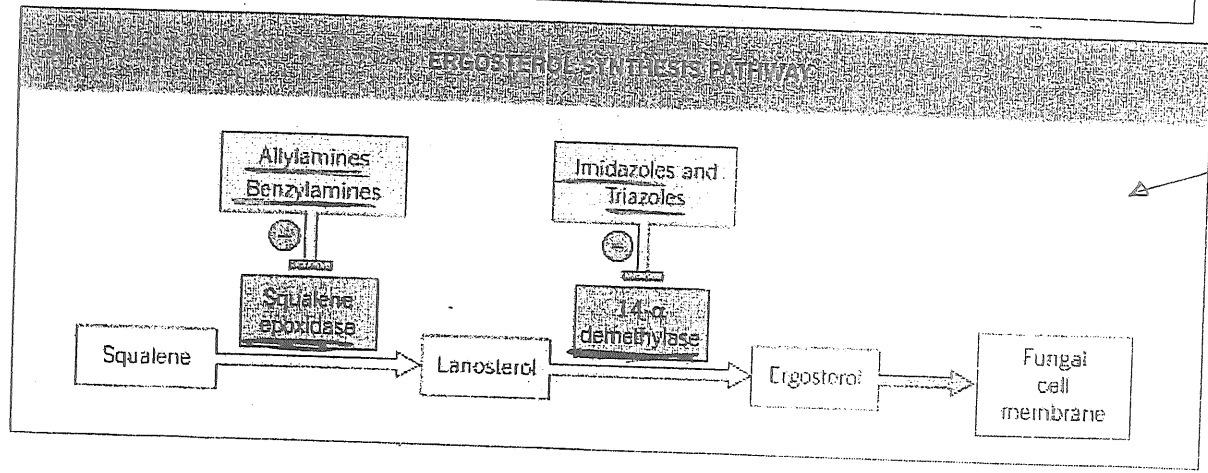
**CYP2D6** : iso form of CYP450.

All fungistatic **EXCEPT**:

- Terbinafine** (static & cidal)
- Tolnaftate** (cidal)
- Nystatin** (cidal in higher conc)



sites of action on fungi



ergosterol pathway synthesis

③ S.E:

(61)

(52)

- **Flucytosine** < BM toxicity  
Hepatotoxicity

\* GIT:  
disturbance.

Colitis.

\* Neurological

Headache ✓  
Fatigue ✓  
Vertigo ✓  
Confusion ✓

\* Electrolyte ↓

Hypok<sup>+</sup>  
Hypoglycemia

- **Grisofulvin** (Very safe)

③ GIT  
Headache  
Flushing

⑤ p: . Purpura  
Porphyrria  
photosensitivity  
Ppt. of L.E  
L.P

بالرغم من استعماله  
كعلاج فني

Hep. Toxicity  
Neut. ↓  
Epist.  
Fever  
Arthralgia  
Leukopenia

Others: leukopenia, Hepatotoxicity, Sore throat  
Neurological & Epistaxis, Fever, arthralgia.

**Polyenes**

(Amphotericin)

Slow IV

5% dextrose

BM Toxicity  
Hepato tox  
Nephrotoxicity

GIT

Common:

Fever  
Chills  
Nausea  
Vomiting

أو نوبات  
الحمى  
القيء

Others:

Cardiac  
Seizures  
LCF

**Ketoconazole**

GIT  
pruritus & rash

① Anti androgenic:

- due to ↓ Steroidogenesis (↓ Suprarenal glands)  
impotence  
↓ Libido  
Gynaecomastia  
Menest. irreg.

① Hepatotoxicity

Idiosyncrasy or  
dose dependant  
incid = 1:10,000

**Itraconazole**

(minimal)

GIT  
Rash

HF  
علاج القلب

**Fluconazole**

(minimal)

GIT  
Rash (EM)  
Headache

All of them:

GIT  
Rash (Morb.)

Ketocon. < Hepatotoxic  
Anti-androgenic

Fluc. → EM

Terb. → SCL & Leukopenia  
PS

KIF & Terbinafine

**Terbinafine**

GIT  
Rash  
Leukopenia  
EM, TEN  
AGEP  
SCL  
PS

الرضاعة

(All systemic)

كله منع

oxicon. ← Topical.

excreted in milk

All systemic Antifungals should be used with caution in patients with Liver & dose adjust ← kidney dis.

Azoles مع HF

تفني → All are Category (C) in pregnancy

EXCEPT: Amphoterecin B & Terbinagine are (D)

لا من مع الحمل

Griseofulvin. < Porphyria ✓  
L.C.F.

Porphyria  
Achlorhydria  
HF

Ketoconazole < Liver dis.

Achlorhydria

(↓ HCL → ↓ abs)

مع HIV

Itraconazole: (as) Ketoconazole + HF ✓

### 5 Absorption of Systemic Antifungals

(fatty)

(Acidic)  
(low pH)

(AEC)

(Any)

جزيء وقوليتيم ← إيطيه مع لبنه أو آيس كريم  
كيتوكونازول و إيتراكونازول ← غير ليمونه أو كولا  
لامازيل ← نالتاك  
فلوكونازول ← أي فود

\* Food: ↑ Absorption of Griseofulvin

\* Antacids: (↓) absorption of Ketocona & itraconazole

\* Antacid: ↑ Absor of Lamisil

NB

Griseofulvin

Absorption is enhanced by

- Fatty meal
- Micronized Formulas

(دقائق) (سوق)

micronized  
(Fulvin)®

ultra microni-  
zed

(Optigrise®)

[لأقوى]

(63)

## Interactions

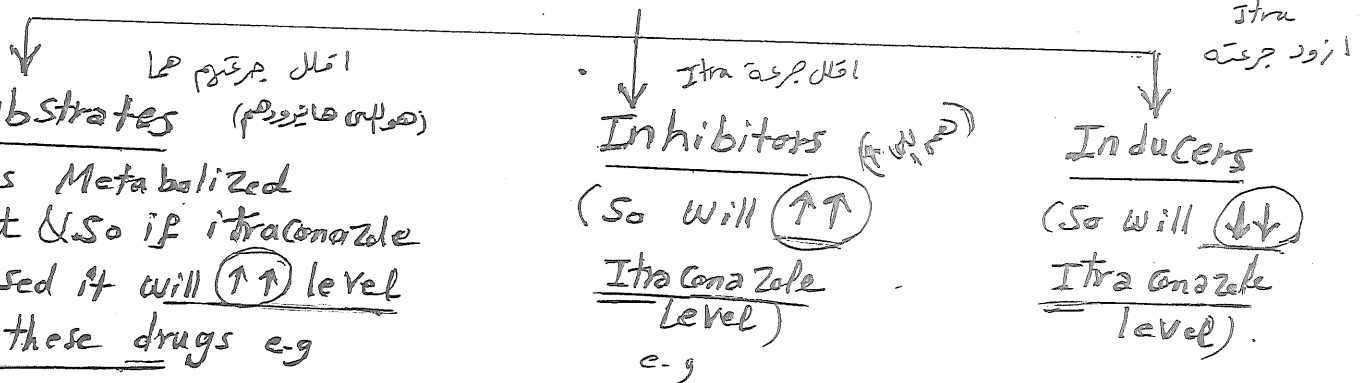
(mainly e Azoles)

### Systemic Azoles

this Antifungal related to (CYP 450 3A4) as following:-

- 1- inhibit CYP450 3A4.
- 2- Metabolized by n n.

### CYP 450 3A4 has



#### ① مجموعة

- Cyclosporine
- Tacrolimus
- Viagra
- HIV protease inhibitors
- Cs
- Erythromycin
- OCPS.

#### ② مجموعة قلب

- Quinidine
- Warfarin
- Digoxin
- CCB

منوع  
أزول  
azoles

#### ③ مجموعة دهن

- Cisapride
- Astemizole
- Terfenadine
- Midazolam
- Trizolam

+ Itra. → Arrhythmia

④ Lovastatin + Itra → Rhabdomyolysis.

- Erythromycin
- Cimetidine
- Omeprazole
- Grapefruit.

- Rifampicin
- INH
- Phenytoin
- Griseofulvin
- Cs

→ أهم ④

بلاش موز  
aldactone مع

اللي موجود في  
Zolam  
lovastatin.

NB Fluconazole also -- CYP 450 (2C9)

So affect Metabolism of:

(65)

- Trifluorol ✓
- Amiodarone
- ✓ Terbinafine.

### 3. Terbinafine Interaction:-

Metabolized  
By  
CYP450 2C9  
-- CYP450  
2D6

• (↑) Level of  $\left[ \begin{array}{l} \text{BB.} \\ \text{TCA} \\ \text{SSRIs} \end{array} \right]$  all metabolized by CYP2D6

• (↓↓) Level of  $\left[ \begin{array}{l} \text{Cyclosporine (by ↑ clearance)} \\ \text{Codeine} \\ \text{Caffeine} \end{array} \right]$  (3C)

• Its Level (↓↓) By: Rifampicin

• its Level (↑) By: Antacids

### 4. Griseofulvin [CYP 450 (3A4) inducer]:

• (↑↑) Alcohol effect. ✓

• (↓↓) Level of  $\left[ \begin{array}{l} \text{Warfarin} \\ \text{Barbiturates} \end{array} \right]$

• (↓↓) Level of  $\left[ \begin{array}{l} \text{OCs} \\ \text{Cyclosporine} \end{array} \right]$

• "منع الحمل" → menstrual irreg. & Conception.

NB: • All Antifungals ↓ Level of Cyclosporine  
Except Azoles

• Gastric acidity essential for:  $\left[ \begin{array}{l} \text{Azoles} \\ \text{Griseofulvin} \end{array} \right]$  (But) ↓↓ Terbinafine

So Antacids  $\left[ \begin{array}{l} \downarrow \text{abs. of} \\ \uparrow \text{Abs. of} \end{array} \right]$  Terbinafine.

## 7. delivery (Exc) to the skin:

3 ways / Direct diffusion to KCs (تقريباً كلهم)  
Sebum  
Sweat

All of them are EXcreted in Both Sebum & Sweat (except)

| Excretion of anti/fungals |             |          |
|---------------------------|-------------|----------|
| Drug                      | In sebum    | In sweat |
| Griseofulvin              | +           | +++      |
| Ketoconazole              | +           | +        |
| Itraconazole              | (+++ both)  | +        |
| Fluconazole               | ++          | ++       |
| Terbinafine               | (+++ major) | -        |

1- Terbinafine: Never in Sweat (تحتوي على ماء في الجلد)

2- Griseofulvin & Fluc: mainly → Sweat

3- Itra & Terbinafine: " → Sebum

4- Ketoconazole: → Both equally.

## 8. Spectrum (Efficacy) of Activity

Efficacy of systemic antifungal drugs

|              | Dermatophytes | Candida | Pityrosporum |
|--------------|---------------|---------|--------------|
| Griseofulvin | +             | —       | —            |
| Ketoconazole | +             | +       | +            |
| Itraconazole | +             | +       | +            |
| Fluconazole  | +             | +       | +            |
| Terbinafine  | ++            | ±       | —            |

Doses Table (1) Systemic Antifungals for Dermatophyte Infections

| Disease              | Griseofulvin<br>Tab=125mg<br>Susp=125mg/5ml          | Terbinafine<br>Tab=125(250mg)   | Fluconazole<br>Cap=150mg                        | Itraconazole<br>Cap=100mg   |
|----------------------|--|---|---|---|
| T.capitis & T.barbae | 125mg/10kg/d/6w<br>كل ١٠ كيلو ١٢٥                    | 10-20kg: 62.5mg/d/4w<br>20-40kg: 125mg/d/4w<br>>40kg: 250mg/d/4w<br>(7 mg/kg/d) | 6mg/kg/d<br>For 6ws<br>or<br>8mg/w for 16ws     | 5mg/kg<br>Per d for 4w<br>w for 4ms<br>كل ٥ كيلو ١٢٥                  |
| Favus                | 125mg/10kg/d/10w                                     |   |   |   |
| T.corporis & T.cruis | 125mg/10kg/d/4w                                      | 250mg/d/1-2w<br>اسبوعين   | 150mg/w/4w                                      | 200mg/d/w<br>(١٤٠)  |
| T.manum & T.pedis    | 125mg/10kg/d(2-3m)                                   | 250mg/d(2-6w)   | 150mg/w/6w                                      | 200mg/d(2w)<br>٢٠٠  |
| Onychomycosis        | 125mg/10kg/d<br>6m in finger nail<br>12m in toe nail | 250mg/d<br>6w in finger nail<br>12w in toe nail                                 | 150mg/w<br>6m in finger nail<br>12m in toe nail | 400mg/d/w pulse<br>every month<br>2m in finger nail<br>3m in toe nail |

(9) Doses: All of the 5 drugs in: (67)

→ Dermatophytes (Tinea capitis, T. facie, T. ... etc)

→ TVC

→ Candida.



~ see before ~

NB : Griseofulvin :

• metabolic product of mould « Penicillium griseofulvum »

Q <sup>~ sign ~</sup> Causes of # failure:

1- Failed Abs

2. ↓ peripheral Circ.

3. Coexisting Pathology

4- 2<sup>ry</sup> infection

5. Idiopathic resistance

6. Poor Compliance

7. Carrier state. (T. Capitis)

as  
Kerion

• Ketoconazole: other uses: (Antiandrogenic)

(1- SD

2. pit. folliculitis

3- Leishmaniasis ✓

4. Reiter ✓

5. Cushing

6- prostatic Cancer.

Griseofulvin doses:-

↓  
microsized

• Adult : 0.5- 1g/ld (loading)

• Child : 10-20 mg/kg (max 750).

(e T. Capitis →  
↑ to 20-25 mg/kgld)

↓  
ultra microsized

(↓ dose 30% of Microsized)

• Adult : 330-375 (350)

• Child : 5-10 mg/kgld  
(max 750)



## Topical antifungal

- 1- classification acc. TO mechanism
- 2- other antifungals

Allylamines  
AZoles  
Polyenes  
+ Others

Antifungal  
Antibiotic  
AntiInflamm.

G+ve

سر  
بوصف

| Others                               |   |
|--------------------------------------|---|
| Ciclopirox olamine<br>( Batrafen )   | <b>A- fungicidal and fungistatic:</b><br>1- -- uptake of precursors required for cell membrane synthesis,<br>2- alters cellular permeability, and<br>3- inhibits fungal respiratory activity, i.e. it interferes with iron-dependent systems including cytochromes, catalases and peroxidases<br><b>B- Antibacterial</b> (G+ve and G-ve). |
| Tolnaftate (Tina Uti)                | As Allylamines  |
| Undecylenic acid                     | ?? Unknown.   |
| Clioquinol<br>(iodochlorhydroxyquin) | antifungal and antibacterial. Its mechanism of action is unknown.   |
| Selenium sulfide<br>(Selsun - Blue ) | Antimitotic and reduces cellular adhesion in the stratum corneum, allowing for shedding of fungi  |

... CM  
... permeab  
... Resp

Other topical agents with antifungal activity not listed in this table include : White field oint \* zinc pyrithione, \*sodium thiosulfate, \* salicylic acid and sulfur, \* haloprogin, \*mafenide, \*amorolfine, \*propylene glycol and \*benzoyl peroxide.

NB: . Anti-inflammatory activity of Antifungals (Topicals):

- 1- Allylamines & Benzylamines: → -- Neut. Chemolaxis
- 2- AZoles -- chemotaxis, Calmodulin, -- PGs & leukotrienes & -- Histamine release.  
 ○ Ketoconazole = antiinflamm. = Hydrocortisone
- 3- Ciclopirox: -- PGs & leukotrienes  
 (أقوى مجموعة على الجلوتات)  
 ← (A) Allylamines & Benzylamin (+++ Dermatophyte / ± Candida)  
 (B) Ciclopirox ( ++ " / ++ " )  
 (C) AZoles ( + " / + Candida )

أقوى مجموعة على الجلوتات  
 (A) (B) (C)  
 T. Pedis ē  
 Low relapse.

2

NB : Miconazole, also:-

- 1- affect TGs & fatty acid Synth.
- 2- -- Fungal oxidative & peroxidase enz.

### (3) Activity of Topical Antifungals

(9)

#### ① Mainly Anti Dermatophytes:

- White field (3% SA + 6% Benzoic acid)
- Castellani's paint (5% LiCl)
  - Magenta red (Basic Fuchsin)
  - phenol
  - Resorcinol
  - Boric acid
  - Acetone

#### ② Mainly anticandidal:-

- K. permanganate 1/500
- Gentian Violet 1%. (Antifungal & Antibact)
- Nystatin.

#### ③ Mainly antiyeast (Malassezia):-

- Selenium Sulfide 2.5%
- Zinc pyrithione 2%
- Na thiosulphate.

#### ④ Broad Spectrum:

- Ciclopirox (Anti  $\left\{ \begin{array}{l} \text{Fungal} \\ \text{bact.} \\ \text{inflamm.} \end{array} \right.$ )
- Imidazoles (Anti  $\left\{ \begin{array}{l} \text{Fungal} \\ \text{bact.} \\ \text{inflamm.} \end{array} \right.$ )
- Allylamines (++) Yeast, (+) Candida
- propylene Glycolic (Keratolytic) \*\*
- Idocheorhydroxy quin (Vi-form)
  - Antibact ± Antifungal.
  - Neurotoxic → so avoid use in diaper for long period.
- Amorolfine / & Haloprogin.

Doses:

١- الكرياتينين أو التراهم : يحدد مريضاً يومياً أو أسبوعياً  
مريضاً كل أسبوعين (غالباً ٢-٤ أسابيع)

70

٢- انظر اسحق:

٣- Topical thr of onychomycosis

٤- oral nystatin

توضع في الفم وتترك لتدمر الفطريات  
ثم تبتلع (مرة أسبوعياً)

٥- الجرعة : ١٠٠٠ وحدة في الفم : ٢ مرة يومياً

٦- إبالاتيم : ٤٠٠ مل ٤ مرات يومياً

Indications ??

S.E

١ intat (CO)

٢ Clioquinol: (Vioform)

③ Neurotoxic

④ discolorat- of clothes skin Hair Nails

Contra indications

→ Hypersensitivity

Interact

→ -ve

## Id Reaction (Autoeczematization; Secondary generalized eczema)

Def: An acute allergic dermatitis develops at cutaneous sites distant from an inflammatory or infectious focus that is not caused directly by the inciting cause of the primary inflammation or infection.

Pathophysiology: قراءة سريعة

- disseminat<sup>n</sup> of Ag.
- " cytokines.
- ↓ initiator
- Cross Antigenicity.
- ↓ initiator
- Threshold.

While the exact cause of the id reaction is unknown, the following factors are thought to be responsible:

- ① abnormal immune recognition of autologous skin antigens,
- ② increased stimulation of normal T cells by altered skin constituents.

= (cross Antigenicity)

- ③ lowering of the irritation threshold, ↓

- ④ dissemination of infectious antigen with a secondary response, and

- ⑤ hematogenous dissemination of cytokines from a primary site.

### Causes

3I

Inf.  
Inflamm.  
Idiogenic.

#### A-infectious

bact →

- \*TB.....tuberculide
- \*leprosy....leproside
- \*bacterial...bacteride

fungal →

- \*dermatophyte...dermatophytide (with kerion and inflammatory)
- \*T.pedis
- \*candida....candidide (monilid)

ectic →

- \*pediculosis...pediculide
- \*Scabide.

#### B-inflammatory

\*Stasis dermatitis (commonest; specially during exacerbation)

- (72) (16)
- \* contact dermatitis (specially if ass. with stasis dermatitis)
  - \* burns.

C- Iatrogenic: Id reactions may be triggered by antifungal treatment.

Clinically: Clinical forms include the following:

-with kerion: maculopapular or papulovesicular rash on trunk

-with inflammatory tinea pedis: (Vesiculo bullous T. pedis)

\* Pompholyx like eruption (common).

\* Other less common (EM like, EN like and bilateral Erysipelas like eruption on the anterior legs)

-with candida: pompholyx like eruption of hands, EAC, chronic urticaria.

-with stasis dermatitis (common): An acute, intensely pruritic, symmetric maculopapular or papulovesicular reaction that involves the forearms, thighs, legs, trunk, face, hands, neck, and feet (in descending order of frequency)

The rash has five criteria:

1. Sudden onset that occur 1-2 weeks after primary infection or dermatitis and usually preceded by exacerbation of the preexisting dermatitis induced by infection, scratching, or inappropriate therapy. (Id reaction to tinea incognito has been reported) or: Highly inflammatory fungal inf.
2. Cannot be identified as a common dermatosis.
3. Not due to direct external contactant or infective agent. (no fungus in lesion)
4. antigen present at a remote sight.
5. Resolution with subsiding of primary reaction (infection/dermatitis).

3 PPT:-  
v. scratch.  
v. inf.  
v. ++

So +ve skin Reaction to fungus → (+ve)

Inv 1. (HP) → ECZ.  
2. Patch test (exclude CO)

1. Try focus ++  
2. Antihistamines & Cs

# Q DD of Dermatophytosis

(73)

1. DD. of T. Capitis  $\rightarrow$  [ Capitis ]
2. DD of T. faciei  $\rightarrow$  faciei
3. DD of T. barbae
4. DD of T. Corporis  $\rightarrow$  annular lesion DD نقطة
5. DD. of T. Cruris  $\rightarrow$  DD of intertrigo نقطة
6. DD of Toe web inf.  $\rightarrow$  inf.
7. DD. of T. manum & Ungium

NB

Commonest organisms

① T. Capitis : T. tonsurans  $\rightarrow$  M. canis

② T. faciei :

③ T. barbae : T. mentagrophytes & verrucosum (Zooophilic)

④ T. corporis : T. rubrum & mentagrophytes

⑤ T. cruris : " & " & E. floccosum

⑥ T. ungium : " & "

⑦ T. manum : as T. cruris

⑧ T. pedis : 
 Interdigital }  
 ulcerative } mentagroph. & rubrum
  

 Moccasin : Rubrum & E. floccosum  
 inflam. : mentagrophytes

# Subcutaneous Mycoses

(74)

- Sporotrichosis
- Mycetoma
- Chromoblastomycosis
- lobomycosis
- basidiobolomycosis

## Sporotrichosis (Rose Gardener's dis.)

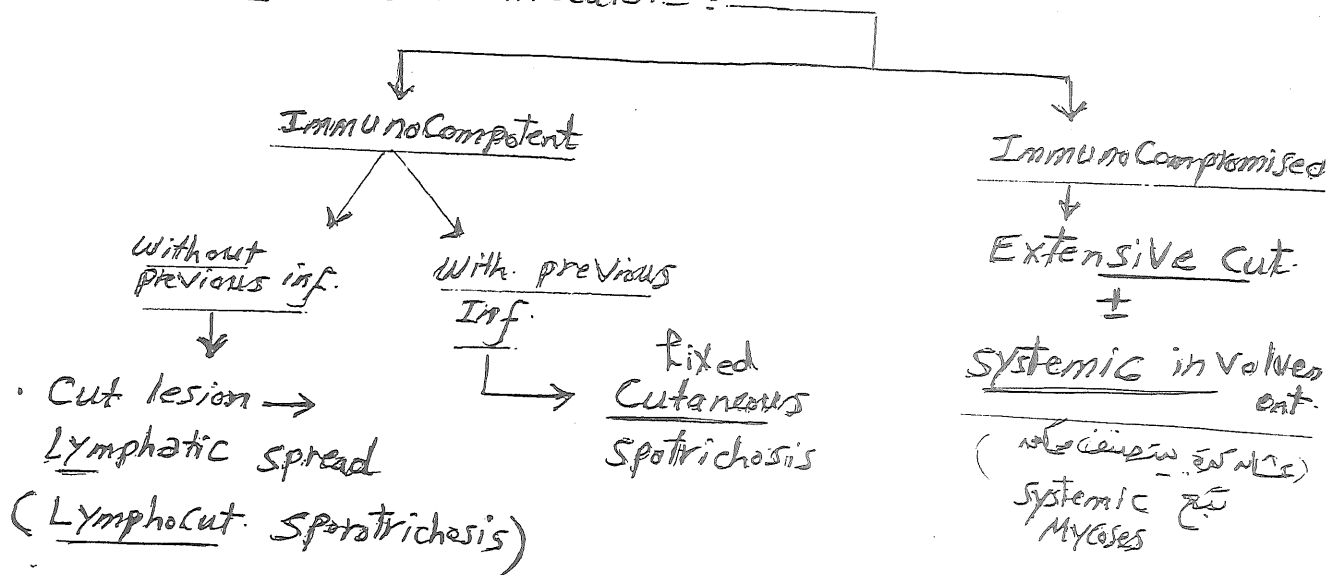
• S.C mycosis caused by:

• organism: Sporothrix schenckii (dimorphic fungus) شيتريكيا

• Source: Soil (archids roses) (فطر متعايش مع النباتات)  
بالتربة والورود

• Mode of Transmission: inoculat<sup>n</sup> by thorns & wood

• Etiopathogenesis: Cut. inoculat<sup>n</sup>:



• Endemic Fixed Variety: remains localized to point of inoculat<sup>n</sup> → Nodules, ulcers, Acneiform lesions, verru cuts. (at high Immunity)

usually By Inhalat<sup>n</sup>

CLP - <sup>Cut</sup> Lymphocut disseminated

(75)

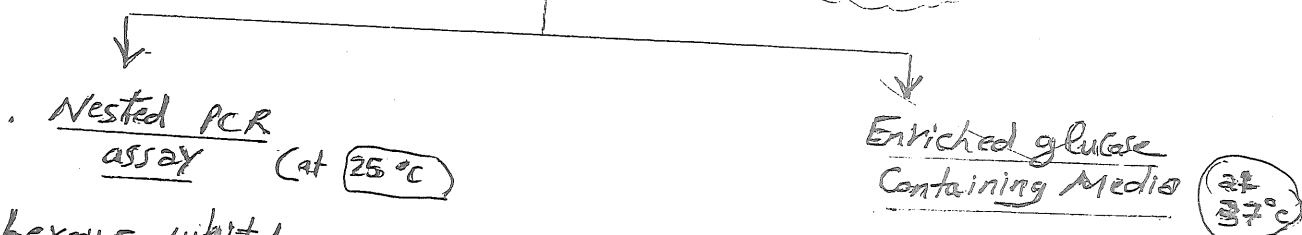
1. Classical (Lymphocut): inoculation  $\xrightarrow{\text{several hrs}}$  Asymptomatic  
 single papule at site of injury (Commonest is hand)  
 → ulcer & purulent discharge → dermal & S.C  
 Nodules & ulcers along lymphatic drainage ✓  
 (على طول الأوعية الليمفاوية) [Sporotrichoid Pattern] →  
 → fibrosed Lymphatics. ~~DD~~ Q

2. Disseminated Lesions: → (S.C) Nodules

## INVs

- ① path: dermal & S.C Suppurative granulomatous  
 Supp. Granuloma Inflamm. & Budding - Cigar shaped  
 Budding... organisms can be seen (PAS, silver or fluoresc. labelled Ig)

- ② Culture: (For pus or Tissue): on: (عزل و زراعة)



NIE: glabrous white  
Brown mold that  
 become firm & linked  $\xrightarrow{\text{dark}}$

NIE: White, Pasty  
 like colonies.

MIE: delicate "canidia" clustered at  
 end of Canidiophores &  
 single thick pigmented  
 Canidia  $\oplus$  seen.

MIE: Cigar-shaped  
 budding "yeasts".

Typical

DD: (of diseases & Sporotrichoid  
 of Lympho Cut. Pattern)

Most Common

Unusual

Rare

- ① Sporotrichosis
- ② Atypical Mycobact.  
 (SP M. Marinum)

- NoCardiosis
- Pyogenic inf.  
 (staph & strept)
- Pseudoallescheria

- TB
- Leishmania
- Cut Scratch dis

- Cowpox
- Anthrax
- Glanders
- Tularemia



## Treatment

- ① Cut & Lymphocut → SSKI & Itraconazole  
 ② Disseminated: → Amphotericin

## SATURATED SOLUTION OF [REDACTED] (SSKI)

Mechanism of Action → Immune modulator → Neut. & Heparin from mast cell → CM  
Antifungal → concentrate in granulomatous  
Necrotic tissue → alter host  
immunologic  
Non Immune Resp.

- 1- In inflammatory diseases: it is thought to exert its effects via immune modulation. Similar to dapsone, [REDACTED] appears to be effective in suppressing neutrophil migration and toxicity.
- 2- In sporotrichosis: unknown, Although neither fungistatic nor fungicidal, [REDACTED] is thought to affect the host's immune reaction to the organism.

**Kinetics**: it is rapidly absorbed, widely distributed into the thyroid and salivary glands, choroid plexus and placenta, and then excreted primarily through the kidneys.

| USE OF [REDACTED] (KI)   |                                |
|--|--------------------------------|
| Saturated solution of [REDACTED] (KI)  | 1 mL = 1000 mg ← Saturated Sol |
| <ul style="list-style-type: none"> <li>1000 mg/ml</li> <li>Droppers are supplied with calibrations for:<br/>           0.3 ml (300 mg) (*)<br/>           0.6 ml (600 mg) <u>آب ٦٠٠</u></li> </ul>   |                                |
| Crystallization may occur with cold temperatures, but rewarming and shaking dissolves the crystals: <u>discard if solution turns yellow-brown</u> . should be diluted in water or juice to try to minimize the bitter aftertaste<br><u>لا تتركه من جرد</u>   |                                |
| Dose: * EN: In adults and older children, common dose = <u>300 mg tid po</u> with starting dose 150-300 tid<br>* sporotrichosis: سابق <u>Start ٤ 300ms x 3/d</u> → <u>١١ grad to 69m/d for ٦m</u>  |                                |
| Side effects of [REDACTED] <ul style="list-style-type: none"> <li>Acute-nausea, bitter eructation, excessive salivation, urticaria, angioedema, cutaneous small vessel vasculitis</li> <li>Chronic-enlargement of salivary and lacrimal glands, <u>hyperkalemia</u>, occasionally hyperthyroidism, <u>acneiform eruption</u>, <u>iododerma</u>, <u>hypothyroidism</u></li> </ul> |                                |

**Indications**: Although [REDACTED] is not FDA-approved for any cutaneous disease, it is a highly effective treatment for cutaneous and lymphocutaneous sporotrichosis (not for systemic). [REDACTED] has also been used successfully for a variety of neutrophilic disorders (Sweet's syndrome, pyoderma gangrenosum), granulomatous disorders (Wegener's granulomatosis, granuloma annulare), and several types of panniculitis (erythema nodosum, nodular vasculitis, subacute nodular migratory panniculitis).

Indications: -

- 1- Neut. dermat.
- 2- granulomatous
- 3- panniculitis
- 4- sporotrichosis

**Contraindications**: The only absolute contraindication is a hypersensitivity reaction to iodides. Relative contraindications include thyroid or cardiac disease, renal insufficiency and Addison's disease [34].

**Use in Pregnancy and Lactation**: category D in pregnancy and compatible with breastfeeding [5].

**Drug Interactions**: Concurrent use with other medications such as ACE inhibitors, -sparing diuretics and -containing medications may result in significant hyperkalemia. Hypothyroidism may result when used in combination with amiodarone, lithium, phenazone and, possibly, sulfones

Salivary  
Lacrimal

ACEI  
Aldactone

Hypoth.

# Wood's Light (وودس لایت)

(77)

Def. Device composed of 2 Parts:

① Wood's Lamp: High pressure Mercury Arc that emits UVA

② Wood's Glass: Barium Silicate containing (9%) Nickel oxide. It's opaque to all light Except 320-400 nm (Mainly 365 nm) UVA

• WL Uses in diagnosis of skin diseases

| disease   | W.L findings.  |
|---|--|
| <p><u>T. Capitis</u></p> <p>fungi responsible for fluorescent Tinea capitis<br/>See Cats And Dogs light</p> <p><u>T. schoenleinii</u>, <u>M. canis</u><br/><u>audouinii</u>, <u>M. distortum</u><br/><u>T. ferrugineum</u></p> <p>All produce a small spore ectothrix hair invasion except <u>T. schoenleinii</u></p> | <p><u>Diagnosis</u>: green fluorescence (ē some strains)</p> <p><u>Screening for HT</u>: by noting Non fluorescence Band of hair (NL Hair)</p> <p>• Green color is due to <u>Pteridine</u> compound produced by <u>Tineas</u>.</p>   |
| <p>• <u>TVC</u></p>   | <p>• <u>Hyperpig.</u> Type: yellow fluorescence</p> <p>• <u>Hypopig.</u>: obvious visualization of inf.</p>  |
| <p>• <u>Erythrasma</u></p>  | <p>• Coral-red fluorescence</p> <p>• <u>Other causes of Red fluorescence</u>:</p> <ul style="list-style-type: none"> <li>• AV (P. Acnes → Porphyrins)</li> <li>• Some Necrotic Pm. (SCC)</li> <li>• Openings of NL SKIN of &lt; <u>Face</u> <u>Trunk</u> ??</li> <li>• PCT</li> </ul> <p>• Red color is due to <u>porphyrins</u></p> |

| SKIN disease  | W.L findings   |
|---|--|
| <ul style="list-style-type: none"> <li><u>Pseudomonas aeruginosa</u></li> </ul> | <ul style="list-style-type: none"> <li>Yellow-green Fluorescence (d.t. <u>Pyocyanins</u>)</li> <li>Used to detect Pseudom. skin inf. in Burn patients.</li> </ul>  |
| <ul style="list-style-type: none"> <li><u>pigmentary disorders</u></li> </ul>   | <p>(A) <u>Hyper-pigm.</u> e.g. Melasma</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>↓</p> <p><u>Epid. Hyperpigm</u></p> <p>↓ W.L</p> <p>Accentuation of pigm</p> <p>(acid, alkali)</p> </div> <div style="text-align: center;"> <p>↓</p> <p><u>Dermal Hyperpigm</u></p> <p>↓ W.L</p> <p>unchanged</p> <p>↓</p> <p>(acid, alkali)</p> </div> </div> <p>other &lt; <u>Epid. Pigm</u> : freckles<br/> <u>Derm</u> : Mongolian spot &amp; post inflam.</p> <p>(B) <u>Hyperpigmented disorders</u></p> <p>Diff. bet. Vitiligo (depigm) &amp; Hyperpigm<br/>       SKIN lesion. (Nevi) leprosy, Tub. sclerosis)</p> <div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>↓</p> <p><u>Vitiligo</u> (Amelanctic)</p> <p>↓</p> <p>Accentuation of depigm. (d.t. ↑ Contrast)</p> <p>↑ Pigm. of NL skin<br/>         ↑ Hyperpigm of lesions</p> </div> <div style="text-align: center;"> <p>↓</p> <p><u>Nevi</u></p> <p>↓</p> <p>Constant color.</p> <p>Differ TS Hyperpigm</p> </div> </div> |
| <ul style="list-style-type: none"> <li>PCT</li> <li>AV</li> </ul>               | <ul style="list-style-type: none"> <li>Coral red fluorescence of <u>urine</u> <u>faeces</u> <u>blister fluid</u></li> </ul>  |
| <ul style="list-style-type: none"> <li><u>Tetracyclines Intake</u></li> </ul>   | <ul style="list-style-type: none"> <li><u>Tetracyclines</u> if: <u>Nail</u> <u>Teeth</u> <u>Sebum</u></li> <li>Ingested by children; Teeth <u>W.L</u> → Yellow</li> <li>deposits in Lunula of nail → pink</li> <li>Nails → d.t. Mepacrine.</li> </ul>  |

others Diagnostic uses

(79)

- *Pityrosporum folliculitis* → yellow green fluorescence
- *Pseudomits* → fluorescence
- Scabies → see Scabies
- Chromidrosis → detect "lipofuscin in clothes"

((NB))

causes of false +ve W.L. Substances that may give fluorescence by W.L:

- Ointments
- Exudates
- Tetracyclines in sweats
- Make up, deodorants & Soap.

علائقہ یخیں  
تنظیم ایکہ  
الافیتا، ماسک  
Orthomax TK

causes of false -ve W.L.

لہذا لگانہ کی طرف سے ہوتا ہے۔

• White Coats of Examiners.

تقریباً ۲-۳ یخیں  
تھیں

• Showering may remove scales of T.V.C → false -ve

• No fluorescent organisms (e.g. T. capiti)

W.L. کے لئے

(۱) مجموعہ کی پیک

اس کے (۱-۲)

(۲) تھیں اس کا حصہ تو ہوتا ہے

(۳) complete dark

(۴) general dark coloration

(۵) اس کا حصہ نہ ہوتا ہے

لکیر (10-15 cm)

(۶) جس میں اس کا حصہ ہوتا ہے

(۷) تقریباً لکیر کا حصہ ہوتا ہے

W.L. سے React  
organism

(نہایت)

Acne  
T.V.C  
ماہی حلقہ

(۸) بالآخر ایکوہ معقولہ کہیں)

# Diagnosis

Differential bet.

2 Types

Detect of Bony  
effect

(1) Grains

2 types

Color

Mic Exam

Crushing bet 2 glass slides  
+ Gram stain

|          |                   |        |
|----------|-------------------|--------|
| (Bact)   | Red (to pink)     | Actino |
| (B/F)    | White (to yellow) |        |
| (Fungal) | Black (to brown)  | Eumyc  |

(1) X-Ray: Periapical En-  
osteomyelitis & Osteone

(2) US: diff bet. Myeloma  
(thick-walled cavity)

fine Echos at bottom of  
Cavities

No Acch  
Enhance

Actino

Eum

early  
Bony  
effect

(3) CT - MRI  
Up to 10% dot in Circle  
Sign

| Actinomycetoma                                     | Eumycetoma   |
|--|--|
| Gram-positive (purple)                             | Gram negative (pink-red)   |
| 0.5- to 1-µm-wide filaments                        | 2- to 5-µm-wide hyphae   |
| Aseptate fine branching filaments (Thin filaments) | Septate hyphae (Thick hyphae)                                      |
| Stained better with Gram stain                     | KOH + Stained better with Gomori methamine<br>silver or PAS stains |

(2) Histopathology

Actinomycetoma

Splendore-Hoeppli  
phenomenon

Star shaped, Homogeneous  
Eosinophilic material  
around the grain"  
(Asteroid Body)



Eumycetoma

Suppurative (Necrotic)

palisading granuloma

Surrounding the  
Grains

(3) Culture & Serology

NB: Pus: Cigar shaped  
Tissue: Asteroid Bodies

## Mycetoma (Madura foot)

|                        | <b>ACTINOMYCETOMA</b><br>(Actinomycosis, Bacterial)   | <b>EUMYCETOMA</b><br>(Maduramycosis, Fungal)   |
|------------------------|---|--|
| Causative organism     | <ul style="list-style-type: none"> <li>- Bacterial (Gram +VE, aerobic, filamentous)</li> <li>- Usually: Actinomycetes belonging to the genera <u>Nocardia</u>, <u>Streptomyces</u> (<i>somaliensis</i>) and <u>Actinomadura</u> (<i>madurae</i> and <i>pelletieri</i>)</li> </ul>   | <ul style="list-style-type: none"> <li>- Fungus</li> <li>- Usually: <i>Madurella mycetomatis</i> and <i>Pseudallescheria boydii</i>)</li> </ul>  |
| IP                     | 3Ms-9Ys   |  |
| C/P                    | <p><u>Triad of</u>: <u>Painless</u> soft tissue swelling, draining sinus tract, extrusion of grains</p> <p>- Foot (70%), then Hands, then other sites</p> <p>- No pain except if 2ry bacterial infection or bone affection</p> <p>- Actinomycetoma tends to progress more rapidly, with greater inflammation and tissue destruction and earlier invasion of bone than <i>Eumycetoma</i>.</p> <p>- Bony lesion may be Lytic (punched out lesions) in Eumycetoma or osteolytic and osteosclerotic in Actinomycetoma.</p> <p>- Associated: scars, dyspigmentation, Lymphoedema (either due to spread or 2ry bact. Infection), spread of infection to all deeper structures</p> |  |
| Complications          | <p>The disease causes disfigurement but is rarely fatal. When left untreated, disease continues to progress, and bacterial superinfection leads to increased morbidity from local abscess formation, cellulitis, bacterial osteomyelitis. In advanced cases, deformities or ankylosis may occur.</p>  |  |
| Differential Diagnosis | <p>Mycetoma has to be differentiated from various deep tissue infections like chromoblastomycosis, infections by atypical mycobacteria, Osteomyelitis (bacterial or tubercular), actinomycosis, botryomycosis, and fixed variety of Sporotrichosis. Subtle differences in clinical presentation as well as results of the diagnostic investigations as outlined below are useful in achieving the diagnosis.</p>  |  |
| Treatment              | <p style="text-align: center;"><b><u>MEDICAL ONLY</u></b></p> <p><u>Antibiotics</u> : Cyclical dosing (1-2 cycles) <u>COMBINATION</u> of 2 drugs for 5Ws</p> <p>A- 2 main: either streptomycin (14 mg/kg/d intramuscularly) or Amikacin (15 mg/kg/d, divided into two daily doses <b>PLUS EITHER</b></p> <p>B- TMP-SMX (DS Tab. [160 mg TMP and 800 mg SMX] twice daily), or Dapsone (1.5 mg/kg/d twice daily)</p>  | <p style="text-align: center;"><b><u>SURGICAL+MEDICAL</u></b></p> <p>- <u>Surgery</u> (to remove small lesions or debulking larger ones) <b>THEN FOLLOWED BY:</b></p> <p style="text-align: center;"><b><u>ANTIFUNGALS</u></b></p> <p>- The most effective are : Ketoconazole (400mg), itraconazole (400mg), voriconazole or posaconazole for period of more than 10 MS.</p> <p>-NB: <i>Madurella mycetomatis</i> is not susceptible to the echinocandins.</p> |

Painless swelling  
 Sinusis  
 Granules

Mode: Implantation  
 from Soil.

3Ms-9Ys

Triad of